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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

SPECIAL NOTICE INSIDE

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EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

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FRG NATIONAL, EUROPEAN SPACE EFFORT DETAILED, INTENSIFIED

Dornier Chief on Space Prospects

Hamburg DIE ZEIT in German 27 Feb 87 p 37

[Interview with Dornier manager Helmut Ulke by Wolfgang Hoffmann, date and place not given: "The Germans Were Much Too Late in the Game"; first paragraph is introduction]

[Text] German space policy has come under discussion. In a study for the Ministry for Research and Technology in Bonn, the Industrial Installations Operating Company (IABG) of Ottobrunn/Munich concluded that "the Federal Republic of Germany does not presently occupy the position in space which, by virtue of its outstanding scientific, technological and economic potential, befits it." What can be done to change this?

[Question] Do you, Mr Ulke, share the view of the IABG study that German space policy is insufficiently organized to the point of being inadequate?

[Ulke] IABG's analysis describes very accurately the present state of affairs. The areas of responsibilities on the part of the contracting authorities, the state, and the relevant committees, are not clearly defined. Now and then we have even experienced jurisdictional problems between authorities dealing with space contracts. And there is no clear delineation between the Research Ministry, which determines space activity, and the various executive organizations, which then let the contracts.

[Question] In the study, five different models for the solution of the problems were offered, only two of which are in fact practical: Either the establishment of a national space agency along the lines of NASA, or the creation of a space affairs ministry. Which of these two solutions do you favor?

[Ulke] The proposed agency solution seems to me to be a good solution. In it, all the responsible offices would be unified in a single organizational entity. All responsibilities--planning as well as execution--would then be centralized in the agency. Political authority for the Federal Republic's overall space effort must, of course, remain with the Ministry for Research in close consultation with other concerned departments. Whether a ministry for space affairs is needed, is indeed more of a political question. We would

certainly be satisfied with an agency and the unification of responsibilities for all international and national activity under one roof. An agency could see to our international responsibilities and interests very quickly and better than has been the case to date.

[Question] You are referring there to the study finding that the German space effort, compared internationally, does not occupy the position which, considering its technical capabilities, properly belongs to it. Is that right?

[Ulke] I believe one has to look at that in a bit more discriminating way: When judged according to the financial contribution which we made to ESA, the European Space Agency, for example, we are not exactly involved in all programs and projects to the fullest extent. When I consider the portions of the production and development projects connected with the Ariane-1 through 4 launch vehicles which have gone to Germany, then, judging by the German contribution to the budget, we should have received technologically more challenging portions. But there are also areas in which we in the Federal Republic are technologically in the lead and in which we are also better off than others. To that extent, IABG's finding is not entirely accurate. But in the case of the new transport systems--Ariane-5 and the European space shuttle Hermes--we must take care that the technological level of our participation will also be high enough. With Ariane-5, it was almost too late once again. France has reserved technologically valuable portions for itself--for example, our share of sensor technology and electronics is much too small. In our view, the entire program is therefore not balanced, which surely has also something to do with the fact that France initiated and defined the program politically, and the Federal Republic decided upon its participation much too late.

[Question] But that is not a matter of a national space agency but rather a matter of the national plan.

[Ulke] As a matter of fact, it happened that, in the case of Ariane-5 as well as with Hermes, we got on board too late with the plans which the French had worked out, although we note with satisfaction that the technological content of our German share is more balanced. But here again it was almost too late.

[Question] First come, first served. That simple?

[Ulke] Whoever determines the plan reserves for himself at the same time the most important technologies for execution. And that is really the fundamental problem. The Federal Republic lacks a consistent political conception regarding space activities. France, for example, has always had a strong national program in which projects and proposals are prepared in great detail on a long-term basis. The French, then, enter discussions in the context of European cooperation with a finished plan.

[Question] France spends about twice as much for space research as the Federal Republic. The United States, however, spends almost 10 times as much as

both countries together. If one also includes military expenditures, then the U.S. budget is almost 30 times greater than that of the two leading European countries together. Can Europe keep up at all in view of such a ratio?

[Ulke] As far as technology is concerned, one can answer yes to that unreservedly. The European communications satellites are proof of this just as the Ariane launch vehicle, which, unfortunately, has some technical problems at present. Nontheless, the European philosophy of building its own launch vehicles is correct. To be sure, the large internal American market ensures that U.S. firms enjoy economic advantages in the case of satellites and launch vehicles. But without our own launch vehicles we would be entirely dependent upon the United States; with our own launch vehicles, we are a competitor of the United States to be taken seriously in the commercial business of launching satellites into space.

[Question] But manned space flight, which we now want to pursue with Hermes, costs real money....

[Ulke] The question is how much we wish to spend on it. I have a definite opinion on this: Europe today, with its approximately 300 million people, cannot afford to leave manned space flight, the industrially important field of the future, to America, Russia, and Japan. It is an absolute must for Europe as well.

[Question] There are serious scientists who say that one can do without man in space. Machines will do it just as well--some things even better; above all, however, more cheaply.

[Ulke] I am familiar with those tendencies and the individual groups who think that it all can be done unmanned. There indeed are missions--we are undertaking them also--for which one does not need man in space. But that is and remains a partial solution: Certain laboratory activities are not possible even today here on earth without man--that is, in a purely automated manner. Automation has its limits. There is also another aspect: Manned space flight results in the overall safety program demanding especially high standards of quality. That affects the overall standard.

[Question] Does one have to go into space for that?

[Ulke] I can only answer that with a counterquestion. What politician would decide to invest some hundreds of millions merely for high standards of quality? They always require a spectacular goal. It is, after all, a matter of demonstrating that we are industrially capable of conducting such missions. We are thereby hoisting a banner of quality for industrial activity in general.

[Question] First, there are currently transport difficulties. Because of the Challenger misfortune and problems with Ariane, completed satellites cannot be gotten into space. Can you envision that the Soviets would also launch West European satellites into space?

[Ulke] If the schedule for the planned launches falls further behind, I would even suppose that ESA would investigate that. There are indeed joint scientific projects and experiments involving the USSR and ESA. And I am convinced that in the next 20 years it will certainly become much more free. One thing, however: Certainly no one would imagine that a NATO military satellite would be taken into space by the Russians.

[Question] Military space research is a burden on the European-American Columbus Program. The United States also wants to conduct military experiments in the planned space station. Do not all further space plans for Hermes collapse? Where should Hermes fly if there is no station?

[Ulke] First of all, I do not believe that the problems which have arisen are insurmountable. There have always been space missions on which military agencies have also flown along. As long as military joint utilization does not turn into an avowedly military mission, I do not see any reason preventing Europe's cooperation with the United States. I am certain that other disputed issues, for example what right of access the Europeans will have to data and station operation procedures, will be solved.

[Question] Suppose that does not happen. Does Hermes make sense if the shuttle cannot make course for a space station?

[Ulke] Hermes would especially make sense if Europe had to say we cannot accept the Columbus conditions. We have planned a free-orbiting mini-station into the Columbus program with which Hermes can dock and abroad which experiments are also possible. It is not a permanently manned station, to be sure, but nonetheless a very important aspect of manned European space flight which will lead industry into wholly new dimensions.

[Question] Do you, in fact, consider military research to be advisable for Europe also?

[Ulke] I have a very definite opinion in this case: It would certainly be good for guaranteeing the peace in Europe if we knew what the other fellow was doing. Since every day reconnaissance satellites pass over Europe--not only those of NATO but also those of the East Bloc--I feel it is necessary that Europe also have its own reconnaissance capability and not be dependent on third party materials. I maintain that always knowing what the other fellow is doing, and letting the other fellow know that you know what he is doing, is the greatest peace protection which we can provide for ourselves.

[Question] Europe spends many billions for manned space flight, but on earth Europeans are not capable of solving much more urgent problems, such as that of environmental protection, for example. How do you explain this incongruity?

[Ulke] One reason for it is that Europe is having a hard time creating common environmental standards. Those are the real difficulties which in turn are associated with very different industrial structures. In the case of the exhaust gas catalyzer issue, for example, the countries' interests were very

diverse. If Europe would set the same standards everywhere all at one, then it would lead to considerable competitive disadvantages for certain countries' industries, while others would have advantages. In contrast to the traditional industrial branches, with space flight we have an entirely different starting position. Right at the start we thought in European terms and uniform standards were created which also facilitated the establishment of company associations. That then promotes the international marketing of joint products. In the case of space flight, the obstacle of the various national standards, which still constitute a barrier to free trade in goods in the other industrial branches, does not exist in Europe. If Europe would proceed with environmental legislation in the same manner as with space matters and establish uniform standards, then we would surely have the environmental problems in check more quickly. To that extent the European common interest in space also has a pilot function for cooperation in all other areas.

Genscher Proposes FRG Space Agency

Mainz ZDF Television Network in German 1200 GMT 10 Mar 87

[Text] Foreign Minister Genscher proposed a special space authority for the FRG. At an economic congress in Cologne dealing with civilian utilization of space, Genscher noted the FRG's and Europe's independence concerning manned and unmanned space flight. Cooperation with the United States must develop into an equal partnership, Genscher said.

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CSO: 3698/332

NEW TECHNOLOGY DIRECTOR AT AEROSPATIALE INTRODUCED

Paris L'USINE NOUVELLE in French 8 Jan 87 p 26

[Article by Jean-Pierre Casamayou: "Claude Terrazzoni: A Pilot in the Factory"; first paragraph is L'USINE NOUVELLE introduction]

[Text] To increase productivity and to consolidate the work of various aspects of the aircraft division: two objectives of the new technology director.

For Claude Terrazzoni the year begins with a new responsibility. Since last week this 51-year-old graduate of the Advanced Aeronautics School is the new technology director of Aerospatiale's aircraft division, a real company with 13,600 employees and four plants. As number two man behind Jacques Plenier, he is directly responsible for the research department and for flight testing, involving a total of 2,000 technicians, pilots, and engineers, who are the brains of the division.

Of course you can easily imagine this former test pilot having a preferance for flight testing and the 300 people ensuring the first flights of Aerospatiale's aircraft, because with 5,200 flying-hours to his credit, Claude Terrazoni still has a passion for flying--a passion he wants to share with his engineers. "I offer my staff 25 flying-hours," he affirms. "For me it is fundamental that those who design the aircraft should also have a feeling for the air."

The technology director, who is above all an engineer, will first of all make sure that the Blagnac research department remains one of the best in the world. The proof: The cockpits developed for the new Airbus and the Hermes space shuttle have already been copied by Boeing and McDonnell-Douglas. Nowadays it is not enough to be a good designer. You also have to manufacture and sell the aircraft. In that respect the French company's situation does not compare to that of its American competitors.

Although the A-320 is selling well, sales of the larger--and most profitable--carriers and of the ATR-42 are stagnant. Moreover, the launching of the A-330 and A-340 will require new investments, a difficult step for Aerospatiale. "Financially, this is not a good time for us," Claude Terrazzoni admits. "If we want to be able to meet competition, we absolutely must lower production costs."

Thus, the technology director's first goal is to increase productivity. To do so, he will continue efforts already begun: the spread of CAD up to the production stage and greater specilization of the division's four plants, whose further automation will unfortunately have consequences on employment and lead to the disappearance of certain types of positions. But economic realities have changed. How can you fill an order for 100 A-320's when production is already sold out until 1993? How can you make a profit from a production line designed for five planes a month, when it only produces two and one-half? These are questions Claude Terrazzoni will have to answer.

The other part of the aircraft division's technology director's task will be to consolidate the work of all the various departments, uniting production, marketing, and finance in one "operational group" for each type of aircraft. This task is made easier by the fact that the technology director comes from the outside. A weapons engineer for the Aeronautics Technology Service, he has only been with Aerospatiale for 3 years. This can only help him to break with the old habits of the house. For Claude Terrazzoni will have to be more occupied with the company's future than with its internal quarrels, if he ever hopes to oversee Aerospatiale's success.

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CSO: 3698/A121

BRIEFS

JAPANESE SATELLITE ON ARIANE--Space Communications Co., a manufacturer of telecommunications satellites and subsidiary of Mitsubishi Corp., has signed a contract with Arianespace France to put two telecommunications satellites into orbit. The contract has an estimated value of between $63 million and $94 million. These two telecommunications satellites will be put into orbit by Ariane 4 from the Kourou space center in French Guyana in the spring and autumn of 1988, allowing this company to provide telecommunications services via satellite ahead of its competitor, Japan Communication Satellite Co. Space Communications Co. has ordered telecommunications satellites of the 1.4-metric ton Super Brid class from the American company Ford Aeropace and Communications and plans to rent the transponders in 1988. The Super Bird will be the first Japanese telecommunications satellite launched by Arianespace. The reaction of Japan Communication Satellite Co. will be closely watched. [Signed J.C.P.] [Text] [Paris CPE BULLETIN in French Dec 86 p 12] 25039

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CSO: 3698/A121

FRANCE'S TOULOUSE BECOMING BIOTECH CENTER

Paris L'USINE NOUVELLE in French 8 Jan 87 pp 32-33

[Article by Marina Angel: "Toulouse Biotechnology Optimistic About the Future; first paragraph is L'USINE NOUVELLE introduction]

[Text] With an impressive concentration of scientists, research centers, and companies, Toulouse and the surrounding region are fast becoming one of the strongholds of French biotechnology.

"Toulouse, together with the entire Midi-Pyrenees region, has access to indisputable resources in the field of biotechnology research." This remark was made by Serge Feneuille, the new director of the CNRS [National Center for Scientific Research], and the evidence is not simply circumstantial. Among the emerging technology centers in France, the Midi-Pyrenees area has indeed many assets. It has declared its ambitions in microbiology, in plant and animal biology, and in pharmacology.

It is not by chance that the Elf-Aquitaine and Sanofi biotech research center was established at Labege, in the Toulouse suburbs. "Even though this center considerably strengthens local capabilities, it could only be installed near an already existing complex scientific infrastructure," states Bernard Lacaze, assistant to the scientific director of Sanofi-Elf Bio Recherche.

Also in the field of microbiology a scientific group has been established: the Research Center for Biochemistry and Cellular Genetics directed by Prof Jean-Paul Zalta. This center unites the laboratories of the Paul-Sabatier University (UPS) and CNRS, teams from INRA [National Institute for Agronomic Research], and the department of biochemical and food engineering of INSA (National Institute for Applied Sciences). In all no fewer than 160 people are involved.

In plant biotechnology a large number of Toulouse laboratories are concentrating on the improvement of plant productivity, including the plant physiology center of UPS and joint molecular biology laboratory of CNRS and INRA. In addition to these government organizations, there are some 10 companies specializing in seed selection and production, each with its own research department. Apart from Elf Bio Recherche and its Rustica subsidiary, mention should be made of Ragt in the Aveyron area and Caussade Semences in Tarn-et-Garonne.

Moreover, Toulouse is also a center of prime importance in France for agronomic and veterinary research. It has 300 researchers and teachers, 350 technicians, and 2,000 students. As for pharmacology, Toulouse is home to a CNRS pharmacology and toxicology laboratory and to a research group in biology and digestive pathology and an experimental endocrinology laboratory, both attached to the INSERM [National Institute for Health and Medical Research]. There are also pharmacological companies in the region, such as Sanofi in Toulouse and Pierre Fabre at Castres, in Tarn.

Today Toulouse and the region hopes to gaining the greatest possible benefit from the industrial spin-offs of this research potential. Yet to make a true success of the biotechnology challenge, two elements are essential: encouraging the spread of research toward local industry and stimulating the growth of a network of smaller businesses specializing in manufacturing technologies (genetic and enzyme engineering, separation technologies,...) alongside the few existing large companies.

This desire is reflected by the creation of a biotechnology and microbiology transfer center [CTBM] in Toulouse. Open since April 1985, this center is financed by the contract plan for national funding to regions and has administrative links to INSA.

It has a triple purpose: to conduct basic research on systems of industrial interest; to promote research in technological concepts and their implementation; to collaborate with the economic sector (training, information, accesibility of the center's expertise...). Thus, six teams work in enzyme and microbiological engineering, cytocultures, and data processing (factory automation and instrumentation). A technology unit run by Philippe Blanc coordinates the industrial development activities.

Among other projects, this unit is currently working on an industry-research program involving the development of new fermented drinks with low alcohol content. Benefiting from European funding, this project brings together three partners: CTBM; SICA [Capital Investment Company] Les Vignobles de Gaillac, the first small French company to produce sparkling grape juice as of 1977; and Setric Genie Industriel, a small Toulouse company associated with the Moet et Chandon group and specializing in the development of fermentation equipment and its control software. A new manufacturing process for sparkling drinks is being studied. The prototype should be operational in March 1987. The process could subsequently be applied to other low-alcohol beverages. "Besides its role as a research-industry interface, our center serves new companies like an incubator for business," explains Gerard Goma, director of the CTBM. "We rent facilities to these companies at reasonable rates, providing the opportunity to use some of the laboratory hardware. This is a way for us to profit from equipment which is not yet fully used."

Thus, in 1985 the BMTC sheltered the young Bio Europe company, which has since moved into its own premises at the Palays industrial zone in Toulouse. This is a typical example of venture capital with the participation of manufacturers--like Roussel-Uclaf or Sucre Union--and of financial institutions including La Financiere de Suez, Banexi, Credit Agricole, and

Citicorp. Bio Europe is an international contractor in the health, fine chemicals, and agro-food sectors. In 1987 the company, led by Pierre Monsan and Jean-Bernard Borfiga, expects to launch a range of its own products on the market, including enzymes specific to diagnosis in medical analyses.

"This is the type of company which should enable the Midi-Pyrenees region to successfully maneuver through the final years of the century and to take a leading position," comments Gerard Goma. A new generation of small and medium-sized companies is already developing.

In the Toulouse CTMB premises, for example, Bio Europe has already made room for other infant companies. One of them, Sonertec led by Jerome Fady, is preparing its launch. Specializing in the development of continuous manufacturing processes for yeasts and lactic ferments, the company should begin operation by next April.

[Box p 33]

Toulouse Laboratories in Space

Microgravity offers particularly favorable conditions for experimentation. In particular, it enables the production of ultrapure products. Thus, space is opening new possibilities for laboratory sciences such as the biotechnologies. This is why the "Microgravity" department of Matra Espace promoted establishment of an economic interest group, called Biospatial, in Toulouse. Matra itself holds 10 percent of the shares; the other shareholders are the manufacturers Aerospatiale (10 percent), Roussel-Uclaf (19 percent), and Bertin (10 percent) and the research organizations CNES [National Center for Space Studies] (21 percent), CNRS (15 percent), and the UPS (15 percent).

In the coming months, all the Toulouse research laboratories involved in biotechnology will be able to join in this interest group through a corps of associate members. That core will also serve all the small-and medium-sized businesses in the biotechnology or space sectors which would like to work like to work in close collaboration with the interest group. Thus far, teams from INRA and INSERM, as well as companies such as Latecoere and Bio Europe, have already expressed interest.

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FRG: MORE SCIENTISTS NEEDED IN BIOTECHNOLOGY R&D

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
5 Mar 87 p 7

[Article: "Too Few Scientists Working in the Pioneer Field of Biotechnology: An Abundance of Product and Process Innovations Could Be Set in Motion/Danger of Monopoly"]

[Text] Frankfurt--The basic innovation fields of the eighties and nineties will encompass, according to the view of Prof Dr Harry Meier of the Ifo Institute for Economic Research in Munich, the electronics complex (flexible automation, telecommunication, office automation, computerization in production, transport, services), the energy complex (energy conservation, coal enrichment, nuclear energy, and regenerable energy sources), new biotechnology (genetic engineering, manufacture of monoclonal antibodies, modern fermentation technology, and also high-performance bioreactors), new materials, and laser technology. For the evaluation of an innovation three criteria are of great importance, namely its economic effectiveness, its ecological compatibility, and social compatibility. Any creative activity would be stopped at the outset if one did not understand its social, ecological, and economic consequences, says Meier.

He declares moreover that for the future of the "new biotechnology" innovation field it will be of decisive importance whether we succeed in educating creative top experts and in giving them the best possible working conditions. The number of scientists who are working with genetic engineering methods amounts in the FRG to 1,250. He says that this is a little more than 10 percent of the number of experts working in the United States in the area of genetic engineering (around 12,000) and it is 5 percent of the number of experts active in Japan (25,000). The need for specialists in the domain of the new biotechnologies he said is growing at the present time very rapidly. In Japan, for example, the figure increases annually by 50 percent.

Dr Meier says that altogether the demand for trained people will increase at an annual rate of from 20 to 30 percent and this particularly in the following areas:

a. DNA recombination (genetic engineering modification of hereditary factors), especially molecular biology, immunology, and software engineers specializing in DNA recombination;

b. biotechnological process engineers for scale magnification and the rationalization of processes which have already been worked out in the laboratory. He said that this also includes the need for bioprocess engineers, biochemists, and microbiologists;

c. specialists for overlapping problems such as enzymology and cell culture.

In addition to the education and promotion of specialists it is also necessary to extend these new requirements to technicians and uneducated workers. The strict maintenance of safety regulations for activities involving genetic engineering substances requires a higher level of training and continued education for these occupational groups. If one may estimate that by 1990 about 5 to 10 percent of the pharmaceutical industry of the United States will be engaged in producing genetic engineering and biotechnical products this would mean that 10,000 to 20,000 employees would have to be retrained or given further training.

Dr Meier obesrves that it has been an important lesson learned in the new biotechnology that the first achievement of genetic engineering problem solutions promises success only when carried out with the assistance of the original creator of these solutions. He says that this is the real reason for the emergence of smaller biotechnological scientific operations. In the United States there arose in the period from 1976 to 1983 over 100 such operations. In the FRG at the present time somewhat more than 40 fairly small biotechnology enterprises are being subsidized by the state. Here Dr Meier says that the German Federal Ministry of Research is assuming a risk participation of 80 percent. He says that the reasons for the low interest in such new establishments have not yet been clarified. Forty of the operations have expanded their production profile in the direction of the new biotechnology. Altogether there are more than 100 enterprises which could be considered to be enterprises in the new technology. Of these, more than 20 operations are using the new genetic engineering.

The strategy of the operations engaged in biotechnological science is to acquire patentable knowledge for product and process innovations and to commercialize them. Such science operations had especially in the United States an important pioneering function. Already in the mid-seventies they had begun to work on the solution of problems in which the large pharmaceutical and chemical concerns displayed interest only in the beginning of the eighties. They played a role similar to that of software operations in the software industry. Characteristically the percentage of highly qualified employees is very great in this area. An analysis of biotechnology operations in California has revealed that over 60 percent of the persons employed in such operations are university graduates and engineers.

In the FRG the example of Bioferon--one of the few middle-sized biotechnology enterprises--shows that here, too, the fraction of highly qualified employees is large. Twenty-five percent are academicians and specialized advanced school graduates and 46 percent are technicians. Biotechnology--as is also confirmed by the Duesseldorf Biotec '87 is the outcome of various natural scientific and technical disciplines. The specialized workers in the domain of biotechnology

would therefore have to be prepared to work in an interdisciplinary atmosphere on interdisciplinary problems. Therefore the surmounting of disciplinary boundaries is an important objective in the training of efficient specialists in the domain of the new biotechnology.

In the view of Meier there can be no doubt that the new biotechnology in the coming years will set in motion a chain of product and process innovations which will place the market position of existing products in question, devalue them, or reestablish them. Altogether there are three different types of product innovation which are involved here: 1) large volume and low value; 2) high volume and medium value; and 3) low volume and high value. Proper exploitation of innovation potential calls for a balanced support of all three variants of product innovation. There exists the danger that the scientific-technical advances in the area of pharmaceutical innovation will be more vigorously promoted than those in the domain of environmental protection. Naturally, products having high value and low volume are at the present time substantially more interesting than those having low value and large volume.

The negative developmental tendencies which could be intensified by the new biotechnology are apparent. They include concentration upon biotechnical products in a few enterprises. The enormous preliminary efforts which must be called forth for biotechnical products as well as the radical nature of the breakthroughs in this domain have made them accessible to only a few enterprises. Hence it is all the more important that know-how which has been acquired with the aid of state subsidies should be made accessible to all interested entrepreneurs. Today as shown by a study conducted by the American Ministry of Economics 50 to 90 percent of biotechnically important products are in the hands of the four largest manufacturers. This is a level of concentration which rarely occurs in other branches of business. It will certainly intensify further with the advance of modern key technologies.

According to Meier, these circumstances give rise to some problems of economic policy in the shaping of the economic framework of the new biotechnology. He considers that here stronger state research support will be important in order to create knowledge accessible to a multitude of producers. In this way it will be possible to avoid monopoly concentrated in a few units of production. Another negative tendency would be concentration of biotechnological knowledge in the hands of a few countries who have powerful research potential at their disposal. In particular this would result in a disadvantage to developing countries even if only because of the fact that these countries possess 75 percent of world population and only 6 percent of world research potential.

Nor does Meier exclude the possibility of misuse of the new technologies--especially of genetic engineering. The danger must be confronted that biotechnology may become an instrument for the degradation, manipulation, and destruction of man. Moreover, there exists the risk that recombined genetic material may be unintentionally liberated and then give rise to consequences which are no longer controllable. But for us not to seize these opportunities would be equivalent to abandoning entirely new opportunities for the conquest of illnesses which had hitherto seemed incurable, for ways of giving human beings a longer and healthier life, and an effective enhancement of agricultural

production and agricultural quality. But the latter is an important prerequisite to providing nutrition for the additional 2 billion inhabitants which will be on this earth by the end of the century.

The contribution of the new biotechnology could be of decisive importance in the solution of this human problem. But naturally once again that presupposes the presence of the requisite social structures. But without the new possibilities opened up by biotechnology such new social structures will threaten to degenerate into empty husks and efforts toward an effective restoration of the environment and toward the opening up of new energy sources will come to naught.

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CSO: 3698/354

BRIEFS

A340 RUNNING ACCORDING TO PLAN--Munich, 17 Mar 87--The goals of the sales campaign for the combined A330/A340 Airbus program that were drawn up more than a year ago have been fully achieved, the board of directors of Airbus Industrie has announced. Thus far, Airbus Industrie has received 104 statements of intention to buy from nine clients for both airplane models. The board of directors has thus resolved to give a formal "go-ahead" on the combined program by mid-April. The first deliveries of the A340 are expected in May 1992, with the A330 following one year later. The A340 is a four-engine, large-capacity airplane with a medium seating capacity in two versions--with 265 or 295 seats--for long distances, with a range of up to 14,500 km. The Airbus A330 is a two-engine airplane with a high seating capacity--330 seats--for intermediate and long distances, with a range of up to 9,400 km. [Text] [Duesseldorf HANDELSBLATT in German 18 Mar 87 p 16] 12271

SIEMENS-PHILIPS 4 M SUPERCHIP IN SERIES PRODUCTION IN 1988

Bonn DIE WELT in German 18 Mar 87 p 11

[Article by Thomas Linke: "In the Running with the Superchip"]

[Text] The contents of more than 250 DIN A-4-sized typewriter pages or a 20-page standard edition of a national newspaper on a small piece of silicon: The realization of this vision is coming ever closer, and the Germans will be among the first people to make it possible. In the worldwide race to develop the components for ever-faster and more efficient computers and other information systems, a significant degree of success has been achieved by Siemens, working with Philips and government support. Yesterday in Bonn, representatives of the company presented Minister for Research and Technology Heinz Riesenhuber with the prototype of a four-megabit chip--less than one square centimeter in size.

"According to all the information about the competition, amidst all their spectacular announcements, the FRG will be catching up with the leading nations, Japan and the United States," the Minister for Research and Technology declared proudly. Riesenhuber appeared confident that the new superchip will be ready for series production beginning in the fall of 1988 and that it will then be possible to make it available on the world market at least at the same time as the corresponding Japanese chips. At the beginning of the project, the Germans were considered to be around 2 years behind the market leaders. A member of the Siemens board of directors, Hermann R. Franz, impressed upon the competition: "We are on time, we are under budget."

The individual circuits on the chip are only 0.8 thousandths of a millimeter wide. This unimaginable density, which was not considered possible at the beginning of this decade, was achieved by using the third dimension of the circuitry--height. "Ditches" one-thousandth of a millimeter wide and four-thousandths of a millimeter deep were drawn in the chip, and it was possible to put additional memory into the walls of these ditches. These memory cells are so tiny that 250 of them could fit on the cross-section of a human hair.

The total costs of around DM 3.4 billion were predominantly borne by the companies. Siemens and Philips/Valvo are spending DM 1.4 billion on development of the chip and DM 1.5 billion on construction of the production

facilities. Riesenhuber's support of the project amounts to DM 320 million, while the Dutch government is putting in DM 160 million.

At present, there is no 4 M chip on the market that is ready for series production. Japanese announcements over the last 2 years have proven to be premature, says Prof Ingolf Ruge of the International Expert Group, under contract to the Ministry for Research and Technology. "Siemens and Philips are very much in the running in the race for the new superchip, a race in which eight companies around the world are participating."

12271
CSO: 3698/367

FRG-JAPAN MARKETING JOINT VENTURE HERAEUS-ABE ESTABLISHED

Duesseldorf HANDELSBLATT in German 20-21 Mar 87 p 25

[Text] Tokyo, 19 Mar 87--Heraeus Holding GmbH, Hanau, has joined with a Japanese trading firm in establishing a company that will sell products in electronics, semiconductor technology and optical telecommunications in Japan.

The Japanese partners are the trading firm Abe Denzai, which has a 20 percent share in the joint venture, and the president of the company, Watanabe, the former managing director of the trading firm, with a 10 percent share.

Heraeus Abe K.K. will be the agent for those production segments of the Heraeus-Gruppe in Japan that are not yet covered by other Japanese Heraeus companies or trading firms. This will include primarily thick-film pastes for electronic circuits, for which a sharp expansion of sales in Japan is anticipated, as well as so-called bonding wires, which connect microchips to their periphery. These wires, made of gold, aluminum or copper alloys, will be obtained both from the Hanau plant and from company production facilities in Korea.

In addition, preliminary products for fiber optics, so-called wave guide tubes--which are sold by the joint venture Shin-Etsu Quartz Products, in which the Germans have a 50 percent share--as well as ceramic dyes for precious-metal decorations on glass, porcelain and ceramics will be offered.

Finally, infrared radiators and systems for industrial heating and drying processes produced in the FRG will also be sold.

The company estimates a first-year sales figure for the new venture of the equivalent of around DM 12 million, while a good DM 35 million would be achieved by 1990. The vice president of Heraeus Abe, Lutz Walter, gives the overall sales figure in Japan, including the companies outside the German company's consolidated circle of ventures, as around DM 500 million.

12271
CSO: 3698/367

FRG: SUBSIDY POLICIES FOR TECHNOLOGY-ORIENTED MEDIUM-SIZE COMPANIES

Cologne RATGEBER FORSCHUNG UND TECHNOLOGIE 1986 in German Aug 86, pp 9-23, 27-43, 59-115

[Excerpts of the "1986 Guide to Research and Technology" issued by the German Economic Services company on behalf of the Federal Ministry for Research and Technology [BMFT], in Cologne, August 1986]

[Excerpts] The Research and Technology Policy of the FRG

Major Objectives of Research and Technology Policy

--The expansion and deepening of scientific knowledge,

--the protection of resources and environment as well as human living and working conditions, and

--the enhancement of performance and competitiveness in industry and trade

continue to be pursued with new emphases.

In the face of challenges which the FRG is encountering in international competition, the federal government wants to give new impulses by means of the following measures:

--restraint of the state with respect to R&D in industry and trade, especially when the subject is imposed, by

--a positive attitude toward technical progress, and by

--recognition of performance and the challenge for top performance in R&D and innovation,

in order to strengthen and consolidate the efficiency of science and R&D, as well as the innovative power and competitiveness of trade and industry in the FRG.

Special attention is paid to faster transformation of research results into industrial applications, especially in the new high technology areas

of microelectronics, biotechnology, telecommunications, materials research, and energy and environmental technology. The R&D policy is oriented toward subsidizing, in particular, the R&D of small and medium-size companies. For this purpose, the instruments for direct and indirect specific subsidies have been expanded. This type of subsidy particularly favors small and medium-size companies. The subsidy criteria are simple and designed to require minimal efforts for application and processing.

The most important R&D subsidy measures for small and medium-size companies are:

--The program for subsidy of R&D personnel, expanded in 1985 by the subsidy for additional R&D personnel. Both measures are unified in the "Federal Government Program for Subsidy of R&D Personnel in Trade and Industry 1985-1988" in order to permit common application and processing.

--To intensify technology transfer, the subsidy program "Commissioned R&D" has been expanded and endowed with considerably more funding. In order to improve the transfer of know-how among experts, the "Research Cooperation Between Industry and Science" program was created.

--New additional indirect-specific subsidy measures are: the subsidy for development of microelectronics-compatible sensors with integrated signal processing (microsensors) and the subsidy for applications of biotechnology processes.

In total, the budget for the subsidy of R&D in small and medium-size companies has been raised considerably. In 1986 about DM1 billion have been allocated for this purpose.

[Signed] The Federal Minister for Research and Technology

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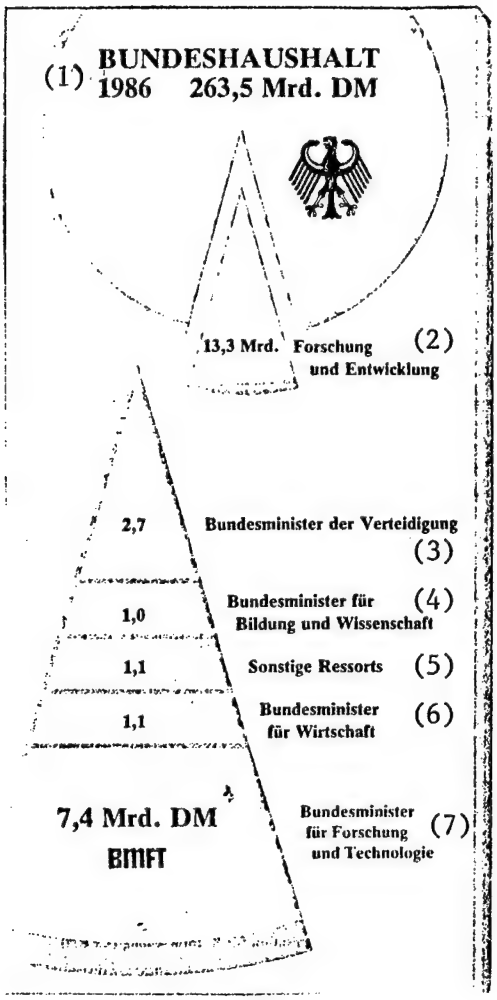
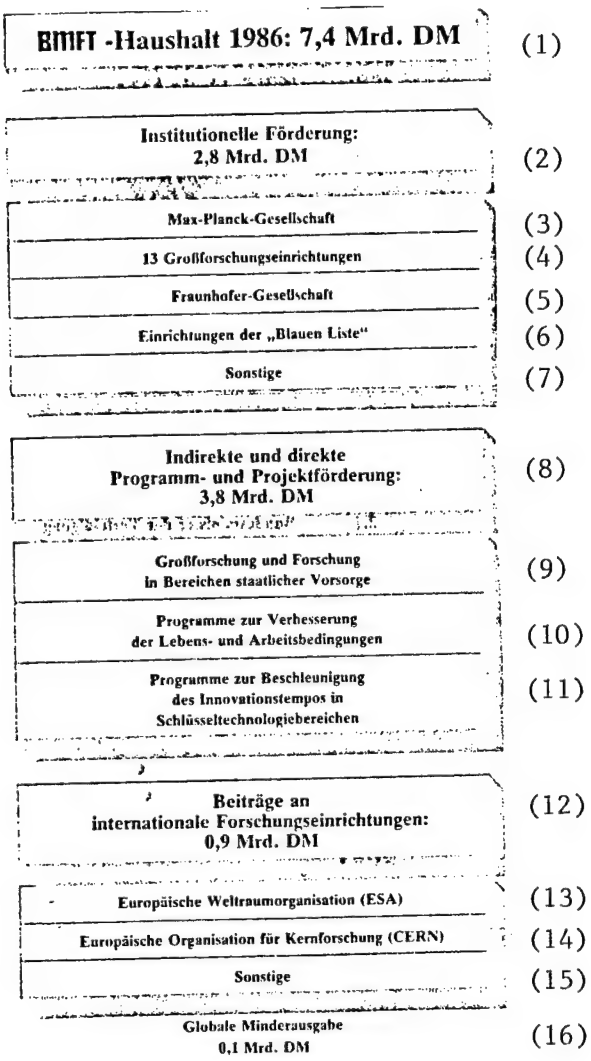
1986 Federal Budget



Key:
(1) 1986 Federal Budget: DM263.5 Billion
(2) R&D
(3) Federal Minister of Defense
(4) Federal Minister for Education and Science
(5) Other Departments
(6) Federal Minister for Economics
(7) Federal Minister for Research and Technology

1986 Budget of the Federal Ministry for Research and Technology



Key:

(1) 1986 Budget, Federal Ministry for Research and Technology: DM7.4 Billion
(2) Institutional Subsidy: DM2.8 Billion
(3) Max Planck Society
(4) 13 Large-scale Research Institutions
(5) Fraunhofer Society
(6) Institutions of the "blue list"
(7) Other
(8) Indirect and Direct Subsidy for Programs and Projects: DM3.8 Billion
(9) Large-scale R&D in the Area of Governmental Preventive Measures
(10) Programs for the Improvement of Living and Working Conditions
(11) Programs for Acceleration of the Speed of Innovation in Key Areas of Technology
(12) Contributions to International Research Institutions: DM0.9 Billion
(13) European Space Agency (ESA)
(14) European Organization for Nuclear Research (CERN)
(15) Other
(16) Overall Reduction in Expenditures: DM0.1 Billion

Indirect and Indirect-Specific Measures for the Subsidy of R&D Innovation in Companies

1.1

Special Deductions for R&D Investments

(paragraph 51, section 1, No 2, letter u EStG [Income Tax Law]; para. 82d EstDV [Income Tax Implementation Decree])

Prerequisites for Claims

Purchase or manufacture during the period from 19 May 1983 to 31 Dec 1989 of depreciable capital goods, excluding movables, and wherein real property must be used at a rate of more than 33 1/3 percent for R&D (valid also for enlargement and expansions).

Amount of Deduction

The special deduction may be claimed in addition to the deductions for depreciation in the fiscal year of purchase or manufacture, and in the 4 years following for:

--movable goods up to a total of 40 percent of the cost of purchase or manufacture,

--real property, up to a total of 15 percent if it is used more than two-thirds for R&D, and up to a total of 10 percent if it is used more than one-third but less than two-thirds for R&D.

Berlin

Paragraph 14 of the law for subsidies in Berlin applies. Accordingly, higher deductions up to a total of 75 percent of purchase or manufacturing costs may be claimed for

--movables which remain in a plant located in West Berlin for a period of at least 3 years after purchase or manufacture and

--real property located in West Berlin which includes buildings, portions of buildings, owner-occupied housing, or rooms in shared property, provided they serve, among other things, for at least 3 years after purchase or construction directly for R&D for more than 80 percent according to the income tax law.

1.2

R&D Investment Bonus

(Paragraph 4 of the Investment Bonus Law)

Prerequisites for Subsidy

A tax-free bonus is granted for the following R&D investments for business:

--Acquisition of depreciable intangible goods (for example, patents); purchase or manufacturing of depreciable capital goods, serving exclusively for R&D;

--Construction of real property (for example, buildings), used more than one-third for R&D.

Amount of Bonus

This amounts to 20 percent of the purchasing or manufacturing costs, provided they do not exceed DM500,000 per year, and 7.5 percent of purchasing and manufacturing costs exceeding this amount.

Special Rules

The purchase costs for intangible goods will only be taken into consideration up to the amount of DM500,000 per year, when the superior federal state authority or the office delegate by it has certified that the goods are destined and suitable exclusively for R&D. Only one-half of the construction cost for buildings is taken into account when the use for R&D is between one-third and two-thirds.

Berlin

Paragraph 19 of the Berlin subsidy law is applicable. The bonus amounts to 40 percent for R&D investments up to DM500,000, 30 percent of purchasing and manufacturing costs exceeding this amount, 25 percent of construction costs for buildings, provided that more than 80 percent of the building is used for R&D.

2.1

Program for the Subsidy of R&D Personnel in Trade and Industry, 1985-1988

A

Grants for the Expenditures for R&D Personnel (R&D Personnel Cost Grants)

Purpose of the Subsidy

Intensification of R&D activities of small and medium-size companies: Through grants for their R&D costs, the companies are supposed to be stimulated to consolidate and reinforce their R&D potential.

Eligible Applicants

Companies in manufacturing; companies involved in the cultivation of useful agricultural plants.

There is the additional requirement that companies must have their headquarters and plants in the FRG, must have annual sales of less than DM50 million and must have employed fewer than 500 persons during the same period of time. The average sales and the average number of employees for the 3 preceding calendar years may also be used instead of these figures.

Companies directly possessing more than a 50 percent direct and/or indirect majority in one or more companies which themselves have more than DM100 million sales per year each, or have a majority interest in other companies with combined sales of more than DM100 million, are not entitled to apply. Interests in publicly owned corporations are treated like interests in companies with sales of more than DM100 million.

Type and Amount of Subsidy

The grant is calculated on the basis of taxable gross wages and salaries paid by the company for R&D activities in the preceding fiscal year. The grant will be 40 percent of these expenses, with a maximum of DM120,000. This subsidy will be reduced to 25 percent for companies which have already received personnel cost grants for 5 years. The grant will be approved for a maximum of 6 years. Proof of R&D activities must be provided by registered working hours.

First time applicants can only be accepted for 1986. Applications must be made prior to 30 September of each year.

B

Subsidy for Additional Research Personnel

Purpose of the Subsidy

Small and medium-size companies are being encouraged to employ new additional personnel for their R&D activities.

Eligible Applicants

Companies in manufacturing; companies involved in the cultivation of useful agricultural plants. It is a further requirement that the companies must have their headquarters and plants in the FRG, that annual sales were less than DM200 million and that during the same period of time fewer than 1,000 people were employed. The average sales and the average number of employees of the 3 preceding calendar years may be used instead to meet this requirement.

Companies which directly or indirectly own more than a 50 percent majority in one or more corporations which themselves had sales of more than DM500 million each, or have majority interests in other companies which together have total sales of more than DM500 million, are not entitled to apply. Interests in publicly owned corporations are treated like corporations with sales of more than DM500 million.

Type and Amount of Subsidy

Grants are calculated on the basis of taxable gross wages and salaries the company expended for R&D activities eligible for grants during the last calendar year relative to new employment in R&D.

The amount of subsidy is:

--for companies with fewer than 500 employees, 55 percent of taxable gross wages and salaries paid within a period of 12 months, starting from the date of new employment for R&D.

--for companies with 500 or more employees, 45 percent of taxable gross wages and salaries paid within a period of 12 months, starting from the date of new employment for R&D.

The amount of the grant is:

--a maximum of DM250,000 per year for companies with fewer than 500 employees,

--a maximum of DM200,000 per year for companies with 500 or more employees.

If a contribution to personnel costs has been granted by the federal minister of economics, this amount together with the additional subsidy cannot exceed these limits.

For new employment for which growth subsidy was granted, a grant for personnel costs cannot be paid for the same period of time. Proof of R&D activity must be provided by registering the working hours; proof for an increase of the overall R&D capacity must be provided by comparing it with the preceding year (on the basis of work hour registration).

The same regulations as for contributions to personnel-related costs are applied to the companies.

2.2

Subsidy Measure

Research Cooperation Between Industry and Science

Purpose of the Subsidy

Improvement of technology transfer between research institutions and companies. The objective of the subsidy is to have research personnel

(junior scientists whose university graduation or promotion does not date back farther than 5 years) work for a limited time (maximum 3 years) in certain research institutions in the area of key technologies, so that scientific insights can be transformed faster into industrial innovations. These research institutions are the large-scale research institutions, institutions of the cooperative research subsidy granted by the federal government and the states (blue list), Max Planck institutes, Fraunhofer Society institutes, university institutes, institutions of AIF [Association of Industrial Research Unions] member associations. Key technologies include, in particular, electronics, telecommunications and information processing, materials research, composite materials, automated manufacturing, robotics, sensor technology, physical technologies, biotechnologies, new energy techniques, and environmental and recycling technologies.

Eligible Applicants

Legally independent companies with headquarters and plants in the FRG, including West Berlin.

Type and Amount of Subsidy

Lump sum contributions:

DM45,000 for the first year,
DM40,000 for the second year,
DM35,000 for the third year

of research cooperation.

2.3

Subsidy Measure for Commissioned R&D

Purpose of the Subsidy

The subsidy of R&D contracts given to third parties by companies in trade and industry in the FRG for solutions to their own technological problems with the aim of obtaining new or improved products or processes through technology.

Eligible Applicants

Companies with headquarters and plants in the FRG, with sales up to DM500 million, which are not connected with the contractor, either legally or through third parties.

Type and Amount of Subsidy

Written-off grants amounting to 30 percent of the compensation paid by the company (without value added tax) for R&D services rendered by

third parties and 40 percent for sales up to DM50 million, but a maximum of DM120,000 per calendar year and company.

3.1

Priority Subsidy for Microperipherals (Indirect-Specific Measure)

Area of Subsidy

The development of microelectronics-compatible sensors with integrated intelligent signal processing (microsensors).

Requirements for Subsidy

Minimum laboratory equipment in one of the necessary miniaturization technologies (surface mounting technology, thick or thin film or hybrid technology, or semiconductor technology).

Sensor manufacturers do not have to prove relevant minimum equipment during the preliminary phase.

Type and Amount of Subsidy

Subsidies of 40 percent of overall personnel costs, external costs for technology consultants, and R&D contracted to third parties, and the costs for laboratory equipment for expansion of the technology laboratory. The maximum subsidy amounts to DM800,000 if both signal processing and the sensor element are being developed in thin or thick film, or semiconductor technology, and DM400,000 if a commercially available sensor element is used for the microsensor.

Special Rules

The application period expires 30 June 1986 while the subsidy period expires 31 December 1988.

Technology-Oriented Subsidy Programs

(Federal Government, States, EC)

1.1

Specialty Programs of the BMFT

General

Objective of the Subsidy

The specialty programs of the BMFT have the purpose of subsidizing high performance, world-class R&D in selected areas of technology. Subsidy recipients are R&D projects which contribute to further development of

the state of technology. In general, R&D projects are conducted by technology-intensive institutions (e.g., companies, universities, R&D institutions) which are appropriately equipped in terms of personnel and technology for activities in new technical territory.

Requirements

R&D projects are subsidized if their theme and R&D goal falls into the framework of a specialty program, if there is a public interest in subsidizing, and if the programs involve considerable technological or commercial risk. The programs may not already be in progress.

Individual projects can only be subsidized if the applicant adequately describes and proves that he has the necessary professional qualifications and has at his disposal sufficient capacity to carry out an R&D program of the kind described in the application. His economic circumstances must be secure and his accounting must be capable of documenting orderly use of government funds. Financial subsidy of projects by the BMFT basically requires that the project be performed and exploited within the FRG, including West Berlin. Projects that are performed abroad by domestic research institutions must be exploited in the FRG including West Berlin.

Subsidy occurs in general through contributions; contracts are only granted when a project is conducted exclusively in the interest of the federal government.

Conditions

The conditions for contributions by the federal minister for research and technology to commercial companies result from the "management principles for contributions on a cost basis to commercial companies for R&D projects (BKFT 75)." Insofar as individual areas require special conditions, this must be noted in the description of the pertinent area of subsidy. The subsidy by contribution, in principle, assumes a self-financing on the part of the subsidy recipient, which in general should amount to 50 percent (Berlin, 40 percent).

For applicants who are not industrial or who have no accounting department, the general and special conditions of the BMFT on expenditure based record keeping apply (ANBest-P-BMFT).

1.1

Electronics

Areas of Subsidy

Development of manufacturing processes for integrated circuits; process technology for microelectronics and computer aided design of complex circuitry;

Materials and equipment for microelectronics, key components.

In general, projects of companies in commercial industry are subsidized.

1.1

Microperipherals

Areas of Subsidy

The subsidy measure for microperipherals consists of three components:

Indirect-Specific Subsidy

See above

Subsidy of Cooperative Projects

R&D work for the solution of general, future-oriented issues can be subsidized (characterized also by especially high risk and high financial cost), which are being resolved in distributed cooperation between companies and research institutions.

Specialized Priorities:

Sensor technologies (micromechanics, integrated optics, etc.) and future-oriented sensor concepts (e.g., chemical semiconductor sensors);

Basic technologies for power semiconductors, interconnected problems of micromechanics (layout techniques, interface problems, etc.).

Technology Transfer

Measures for improvement of transformation and distribution of R&D results.

1.1

Technical Communication

Areas of Subsidy

Components and systems in optical telecommunications: beam waveguides, lasers, diodes, broadband signal processing, switching equipment, optical transmission systems, integrated optics;

Key technologies for new communications systems: display technologies, video technology (high definition TV);

Data communications: German research network, local area networks.

1.1

Information Processing

Areas of Subsidy

In accordance with measures 29-31 of the government report on information technology:

Computer aided design systems (CAD) for computers and software, new computer architectures, knowledge processing (expert systems), and pattern recognition (language recognition and image processing).

Subsidy is granted for joint projects, where several companies cooperate with the possible participation of universities and research institutions.

1.1

Technical Information

Areas of Subsidy

Organization of databases, in chemistry, physics, health, and environmental sciences;

Expansion of existing reference bases banks;

Creation of new reference bases in computer science;

Intensification of the utilization of technical information (among other things, improvement of the cooperation with technical publishing houses, book stores, and technical information institutions for distribution of information; innovation enhancing exchange of information);

Basic work regarding electronic publishing and organization of an information network for industry and applied research.

1.1

Biotechnology

Areas of Subsidy

The biotechnology subsidy measure consists of the components:

Indirect-Specific Subsidy

See above

Subsidy of Joint Research and Subsidy Projects

Microbiology and genetic engineering in microbes
Cell culture techniques
Bioprocess technology and enzyme technology
Research on plants and animals
New areas of applied biology

In addition, methods for the replacement or supplementing of animal experiments will be subsidized, as well as safety research and evaluation of the consequences of technology.

Indirect Subsidy

Establishment of technology-oriented companies (TOU) in selected areas of biotechnology will be subsidized, as well as the subsidy of junior scientific staff by DAAD [German Academic Exchange Service], DECHEMA [German Society for Chemical Equipment, Chemical Technology, and Biotechnology], and VCI [Chemical Industry Association].

1.1

Materials Research, Metallurgy, and Corrosion and Tribology

Areas of Subsidy

Materials Research

1. Structural ceramics
2. Powder metallurgy
3. Polymers with special properties
4. Composite materials
5. Metallic high temperature materials

Areas of Subsidy

Metallurgy

1. Ore processing
2. Metal production
   a) Ferrous metallurgy
   b) Nonferrous metallurgy
3. Recovery

Areas of Subsidy

Corrosion and Tribology

1. Corrosion and corrosion protection
2. Friction, wear, lubrication

1.1

Chemical Process Technology

Areas of Subsidy

Catalysis Research, Membrane Research

1.1

Production Technology

Areas of Subsidy

The program for manufacturing technology has three components:

Indirect-Specific Subsidy

of manufacturing companies by subsidizing CAD/CAM development work for company use and development of industrial robots, handling systems, and related peripherals.

The approval phase for these measures has ended. New projects will no longer be subsidized.

Subsidy of Joint Projects

Subsidy is available for R&D work for the solution of general, future-oriented questions (also characterized by especially high development risk and high financial expenditures) which are solved by companies and research institutions through joint efforts, with a division of tasks. Technical priorities: advanced handling technology, assembly technology, safety of the manufacturing process, key technologies for manufacturing.

Technology Transfer and Evaluation of the Consequences of Technology

Measures for the improvement of transformation and distribution of R&D results. Investigations with the aim of determining the prerequisites and consequences of the use of modern manufacturing technologies and of the demands to be made on them.

1.1

Physical Technologies

Areas of Subsidy

R&D for the following priorities:

Laser technology and radiation induced processes

Surface and microstructure technology

Plasma technology (except fusion)

Low temperature technology (cryotechnology and superconductivity technology)

Electronic image technology (still picture)

Technology consulting (especially consulting, technical discussions, documentation)

Analysis of future technologies

1.1

Space Research and Technology

Scientific and commercial use of space through:

--Space station/space platforms, satellites and space probes for tasks in space research, earth observation, and communications

--Space laboratories for materials research and process technologies as well as for bio-scientific research in space

--ARIANE launcher

Areas of Subsidy

Space station (construction of an infrastructure in space consisting of manned modules and unmanned platforms for the execution of long term experiments under microgravity; maintenance and repair of systems in orbit, as well as integration and testing of spaceflight equipment in orbit).

Use of the spacelab (experimental and demonstration projects for materials research and process technology, biomedicine, earth observation and communications/navigation, extraterrestrial science).

Extraterrestrial basic research (astronomy and astrophysics, solar terrestrial relationships, life support systems, re-entry technologies).

Earth observation (meteorology, oceanographic and terrestrial observation by means of optical and microwave sensors).

Communications (satellite platforms and payloads for telecommunications and broadcast satellites, transmission methods, mobile earth stations, navigation receivers, sea distress radio systems).

Space flight technologies (equipment such as robots and manipulators, data processing and transmission, propulsion systems, energy supply systems, microwave and optical observation systems).

ARIANE (further development of the ARIANE family up to ARIANE 4 and 5, high performance engine HM 60 for ARIANE 5).

In space research, public supply contracts predominate. Because of the greater proportion of European projects, contracts of the ESA dominate. The major contracts are for large-scale projects. This offers an opportunity for participation of small and medium-size companies through subcontracts.

A broader exploitation of spaceflight-related projects by industry is supported.

1.1 Aeronautical Research and Technology

Goal

The goal of the subsidy is the creation of a scientific-technological basis for the competitive manufacture and safe operation of civil aircraft. The subsidy operates in [the following] sub-programs: technological basis, civil components program, propulsion unit technology, air traffic technology, test installations.

Further Information: [not included]

BMFT report "Making Flying Even Safer and Cheaper"

Aeronautical Research and Technology, Status Report 1983

Third Comprehensive Program for Aeronautical Research and Technology of the Federal Government 1986-1989

Federal Minister for Research and Technology, Section 514, and BMFT project participation in aeronautical research at the operating company for industrial installations.

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1.2

Subsidy for the Development of Civil Aircraft, Helicopters, and Power Units

Objective of the Subsidy

Financing of civil aircraft, helicopter, and power units development up to the mass-production stage.

Eligible Applicants

Companies in the aircraft industry with headquarters in the FRG.

Type and Amount of Subsidy

Grants with profit-sharing for up to 60 percent of the development costs within the framework of available national funds (for international joint projects or experimental development projects this amount may be exceeded). Profit-sharing depends on the number of delivered aircraft and other special income connected with the development.

1.2

Subsidy of Joint Industrial R&D

Objective of the Subsidy

Financing of projects for application-oriented, technical-scientific basic research in the 93 research associations of the AIF, which represents approximately 26,000 predominantly small and medium-size companies in 32 industrial branches. Results of the research will be published in accordance with the joint use policy of the AIF. These results enable small and medium-size companies lacking their own research capabilities to base their product and process development on sound scientific results.

Requests and suggestions for the start of research projects may be indicated by interested companies to their member association. These associations will either conduct the research on their own account or apply for federal funds through the AIF. Applications will then be examined by AIF professional experts and recommended by the AIF approval committee to the BMWi [Federal Ministry for Economics] for subsidy. Transfer of research results into practical applications (technology transfer) may also be subsidized, for example, through advising member companies.

Eligible Applicants

Member associations of the Confederation for Industrial Research Associations (AIF).

Type and Amount of Subsidy

Project related, nonrefundable contributions in the amount of qualifying costs, provided that the given research association applies at least an equal amount of its own funds for the purposes of the joint research.

1.2

Subsidy for R&D in Small and Medium-Size Companies in Berlin

Objective of the Subsidy

Increasing productivity and competitiveness of small and medium-size industries in Berlin by decreasing the risk of R&D work.

Eligible Applicants

Small and medium-size industries with headquarters, production, and R&D in Berlin, craft trades in Berlin with industrial character, and unions of such companies.

Type and Amount of Subsidy

Up to one-third of the total cost as a written-off grant, up to one-half of the total cost as contribution which is refundable if the research is successful, up to two-thirds of the total cost as an interest-free zone.

3

EEC

General, for all Areas

Type and amount of the subsidy through the EEC:

For cost distribution contracts ("Indirect" programs) normally up to 50 percent of the contract value,

for joint actions: the EEC assumes the coordination, including costs for coordination incurred by the EEC.

Eligible Applicants

Industry, universities, research institutions.

Areas of Subsidy

Subsidy To Enhance Industrial Competitiveness

a) Elimination and reduction of obstacles: R&D program in the area of applied metrology and reference materials (reference office of the EEC-BCR--term 1983-1987

b) New technologies and new products for conventional industries

--Research Action Program for Basic Research in the Area of Industrial Technology in Europe (BRITE)--term 1985-1988

c) New technologies

--European Strategic Program for R&D in the area of Information Technologies (ESPRIT)--term 1984-1988

--Preparatory action for an EEC R&D program in the area of Telecommunications Technologies in Europe (RACE)--1985-1986

--Pluriannual Program in the area of data processing--term mid 1984 to mid 1986

--Pluriannual Program in the area of biotechnology--term 1985-1989

Improvements of the Efficiency of the Scientific and Technical Potential of the Community

Horizontal Actions

--R&D program for an advanced machine translation system (EUROTRA)--term 1983-1987

--Plan for the stimulation of cooperation and exchange in the area of science and technology in Europe--term 1985-1988

--Action plan for the evaluation of R&D programs in the Community

--Developmental program for forecasting and assessment in the field of science and technology (FAST)--term 1983-1985

Justification; Capital and Credit Assistance; Venture Capital

1.1

Pilot Project: "Subsidy of the Establishment of Technology-Oriented Companies"

Objective of the Subsidy

Project-related contributions and venture capital participation for innovation projects in connection with the establishment of technology-oriented companies or newly established small companies.

Eligible Applicants

--People who want to establish a technology-oriented commercial business, or

--technology-oriented companies operating in trade and industry which are not older than 3 years, have no more than 10 employees, and in which third parties do not have majority shares.

Regional Variations

The projects should be carried out in those regions which are serviced by the following technology consultation offices:

Ruhr Technology Consultation Office located in Bochum and the districts of the chambers of industry and commerce of Bochum, Dortmund, Duisburg, Essen, Hagen, and Muenster.

East Bavarian Technology Transfer Institute located in Regensburg with the districts of the chambers of industry and commerce in Bayreuth, Coburg, Regensburg, and Passau.

VDI Technology Center, Berlin and the federal state of Berlin.

Hamburg Institute for Technology Subsidy with the federal state of Hamburg and the bordering territories of the federal states of Lower Saxony and Schleswig-Holstein.

Center for Productivity and Technology along with Saarland

Chamber of industry and commerce consulting corporation for companies and technology located in Karlsruhe with the districts of the chambers of industry and commerce of Karlsruhe and Pforzheim.

Federal Variants

The following items are not subject to regional restrictions:

Microelectronics variant:

Innovation projects where microelectronics is predominant, and projects which aim at the manufacture of equipment for production of microelectronics components.

This type of project is basically taken care of by the VDI Technology Center, Berlin. Insofar as they fall under the areas of regional offices, supervision will be determined by mutual agreement of the parties involved.

Biotechnology variant:

Innovation projects in the following sectors of biotechnology:

--cell culture techniques

--genetic engineering

--biotechnical processes with plant, animal and human cells, and micro-organisms which are altered by genetic engineering

--enzyme technology processes for drug and food applications.

Variant of Technology Centers:

Innovation projects which are carried out in a maximum of 15 selected promotion centers or technology parks.

These promotion centers or technology parks will be designated by the federal states.

Venture capital variant:

Innovation projects in phases II and III, at least 25 percent financed by venture capital companies.

Type and Amount of Subsidy

--For testing of the project (Phase I) nonrefundable grant up to 90 percent, to a maximum of DM54,000.

--For R&D work (Phase II) nonrefundable grant up to 75 percent, to a maximum of DM900,000. Joint ventures in bank loans up to 50 percent, to a maximum of DM150,000.

For production equipment and introduction into the market (Phase III) joint ventures in bank loans up to 80 percent, but with a maximum of DM1.6 million.

1.3

KfW [Credit Institution for Economic Recovery] Mid-Size Company Program

Objective of the Subsidy

This includes among other things, product and product processes innovation (subsidies cover investments, expenses for goods and personnel for testing, start of production, marketing).

Eligible Applicants

Small and medium-size companies in trade and industry, as well as freelance professionals throughout the FRG and West Berlin, with sales normally not exceeding DM300 million, or DM500 million for environmental protection measures, (includes sales of connected companies).

Type and Amount of Subsidy

Financing portion: one-half as a rule, for small companies (annual sales threshold of DM50 million) up to two-thirds of the amount for investment or innovation. Amount of the credit: up to DM5 million.

Conditions

Current interest rate of 6.25 percent per year, payment 96 percent, approval commission 0.25 percent per month, starting 1 month after the approval date for credit funds not yet dispensed, maximum term of 10 years, including 2 redemption-free start-up years.

The KfW is also prepared to grant a credit provided that the interest rate and the amount paid out are not fixed until the time of credit utilization (credit options).

If only securities which are not sufficient for the credit institution to assume the primary liability are available for the innovation project, a 75 percent exemption from liability for the credit institution can be applied for (venture financing of innovations). For credits which are partially exempt from liability, an additional venture fee in the amount of 2 percent per year must be paid. For innovation projects in the area of environmental protection, the additional venture fee of 2 percent per year is calculated under the conditions of the KfW environmental program which is more advantageous by 0.5 percent per year.

Security: Basically, depending on assets and within certain limits, other types of banking securities, including guarantees by credit guarantee associations.

1.3

KfW Technology Program

Objective of the Subsidy

Investment subsidy for small and medium-size companies which utilize new technologies within the framework of cooperative ventures with partners from developing countries for manufacturing in those countries.

Eligible Applicants

Small and medium-size companies throughout the FRG and West Berlin, whose annual sales in the preceding 3 years averaged less than DM200 million (including connected companies), and, in exceptional cases, even larger companies.

Type and Amount of the Subsidy

Loans normally amount to 50 percent of the financing portion from the German company, as a rule the maximum amount is DM2.5 million.

Conditions

For investment loans: interest rate up to the beginning of amortization 1 percent, then 2.5 percent; pay out 100 percent; maximum term of 15 years

with maximum 5 years redemption-free. Repayment of the loan and/or payment of interest may be totally or partially waived if the loan recipient can demonstrate that in the long term he cannot be commercially successful with the introduction and utilization of the new technologies.

For preparation loans (maximum 10 percent of the total loan): in the beginning without interest and amortization. When a subsequent investment loan is granted, the same conditions as this loan apply. If completion of the project is not feasible or is not possible for the applicant, repayment of the preparation loan is waived.

2

Technology and Promotion Centers

A great number of "local community" companies with different names such as promotion center, innovation center, technology center, technology plant, technology park, or research park have been created in the FRG in the last few years. These local communities are interested in the establishment of new and young technology-oriented companies. In order to facilitate the starting phase for entrepreneurs, facilities for R&D and manufacture are put at their disposal. In addition, office and administrative services, management and consulting services, and technical support are being offered. There are also possibilities for cooperation with neighboring research facilities.

5

Participation Through Capital Investment Societies

Small and medium-sized companies can obtain subsidized participation from private capital investment societies for expansion of their own capital base or for consolidation of their financial relationships with public contributions.

Medium-sized capital investment societies include, for example:

Medium-sized Investment Society Baden-Wuerttemberg GmbH
Werastrasse 15
7000 Stuttgart 1
Tel.: (07 11) 21 02 71

Capital Investment Society for Medium-sized Industry and Trade of Bavaria mbH
St. Anna-Strasse 15
8000 Munich 22
Tel.: (089) 21 42-237

Capital Investment Society of the Savings Bank Organization

Addresses:

Names and addresses may be obtained from savings banks or state banks and clearing houses.

Conditions

Amount of participation up to DM750,000, but with a maximum amount equal to the company capital shown on the balance sheet. Maximum term: 10 years.

Objectives for Use

Among other things, financing of concrete projects. These include:

(Partial) Financing of investments in construction and machinery including innovations.

The project must not yet be in progress.

Eligible Applicants

Small and medium-sized companies in trade and industry which have no participation from a capital investment society or any other financing institution. The company must have been in existence for at least 3 years. The quality of company management and the company's potential for results must show long-term promise of appropriate returns and proper evolution of the investment.

Securities

Other than the assumption of guarantee by the owner--shareholder--none. The securities remain freely available for credits.

Costs

The costs of the participation must not exceed an average of 12 percent per year of the total invested for the duration of the participation. The above-mentioned investment societies in Baden-Wuerttemberg and Bavaria require a payback of approximately 9 to 10 percent per year.

Liability for Loss

In case of bankruptcy or the legal equivalent the investment participates in the loss.

Application Procedure

Application for participation can be made to the capital investment society without a special form.

Establishment of Technology-oriented and Innovative Companies

Special possibilities exist with some medium-sized capital investment societies for participation in establishment of technology-oriented or innovative companies. There are some additional advantages available through subsidy measures of the individual federal states (see also state programs). Details may be obtained directly from the relevant medium-sized capital investment societies of the federal states or from the information offices designated by the state programs.

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CSO: 3698/M134

SWEDEN: SCIENCE POLICY TARGETS EDUCATION, DEFENSE, INDUSTRY

Defense Funds Communications Research

Stockholm NY TEKNIK in Swedish 19 Feb 87 p 21

[Article by Anders Ingvarson: "Civilian Information Technology Falling Behind"; first paragraph is NY TEKNIK introduction]

[Text] The interests of defense will influence research in information technology in the next few years, and the civilian aspects will lag behind. This was asserted by Jon Sigurdson, professor of research policy, in an analysis of the research bill which the government is presenting today.

The Ministry of Industry is adding an economic policy proposal to the research bill which, among other things, contains a package of a billion kronor for industrial development work within the area of information technology.

Half of that amount will come from the Defense Materiel Administration (FMV), the Telecommunications Administration and the Industrial Foundation. It is intended that the business community should pay for the rest.

Among other things, FMV wants to see the development of environmentally compatible integrated circuits which can withstand radioactive rays.

"A large part of this money will go to research which is strongly influenced by the interests of defense.

"There are strong defense interests at the bottom of this investment. The Ministry of Industry has not been able to create a civilian industrial program in the same way. A dialogue between the parties has been lacking, which could have created the initiative," said Professor Sigurdson, who participated in the work on the research bill."

"It would have been natural for the Ministry of Industry and the Technical Development Board to take a more aggressive position."

In his analysis he said that the Ministry of Industry was the least involved when it came to deciding on this investment, while the Ministry of Defense was the driving force.

These viewpoints were presented in the book "Svensk forskning, en kommentar till den forskningspolitiska propositionen 1987" (Swedish Research, a Commentary on the Research Policy Bill of 1987).

It is being released today, at the same time as the bill itself.

Behind the book are researchers at the Research Policy Institute in Lund, plus Professor Rune Premfors in Stockholm and Aant Elzinga, professor at the University of Goteborg. During the winter the professors participated in the work on the bill.

NY TEKNIK had access to the manuscript of this book in advance, which in several places criticizes Swedish research policy. But the final judgment given is still that the government is now making a real investment in strengthening the universities and colleges.

"For the first time in a long time a step is taken toward a better balance between research in the universities and research in industry and the industrial branches," said Jon Sigurdson.

As for the large investment in information technology, which is outside the research bill itself, he said that could lead to the dominance of defense-related research.

As for the research bill itself, what is lacking from the bill is more criticized than what is in it.

"There appears to have been unity on the need to strengthen the colleges, but the power was lacking to to create large national investments in the area of technology. We are still lacking a national program for materials technology. Sweden should do significantly more in that area. We do not have the research policy today that we need to develop this very important area. We are probably also lacking knowledgeable personnel in this area.

"Before the next research bill the government should establish a program dealing with materials technology."

65 Million More

Biotechnical research gets an increase of 65 million Kronor. That is probably a correct investment. It says in the analysis that Sweden has great possibilities to reach an advanced position this area.

The problem for a small country such as Sweden, exposed to competition, is that the research must be of high quality in a number of areas. We must be capable of seeing what is happening internationally, have the ability to conduct important research, and be the advanced spearhead in research on a

limited number of areas, confirmed the authors in an introduction wherein they discussed Sweden in the international picture.

The researchers also discussed the problem of too strong links between industry and the colleges. In his section entitled "Strukturproblem--balans eller strategi" (The Problem of Structure--Balance or Strategy) Aant Elzinga writes that the government is passive when it comes to strengthening the position of universities against the increased pressure of the business community.

Good Grade

Even though the researchers in Lund are critical of a lot of things in the research bill that the government is presenting today, they still give it a rather good grade.

Prime Minister Ingvar Carlsson's interest in research has certainly played a part in the increased appropriation, said Rune Premfors. He confirmed that this strong economic step became possible through savings in other areas of education.

Compared with the two previous research bills, this one favors the major players: the Ministries of Education, Defense and Industry. While the weaker players, for example housing research, are left behind.

Education Basis for Future Industry

Stockholm NY TEKNIK in Swedish 19 Feb 87 p 20

[Article by Hans Werner: "Colleges Will Save Industry of the Future--and Olof Palme Is Honored With His Own Guest Professor"; first paragraph is NY TEKNIK introduction]

[Text] Basic knowledge is lacking in many areas. The basis for industrial development is weak in many areas. This demands increased research and development, asserts the government in its research bill.

Therefore it invests almost entirely in a three-year plan for development of basic research by subject matter in universities and colleges.

In other areas, such as information storage, the business community is advised to deal with it themselves.

Energy research has been broken away from this relationship. Birgitta Dahl will report on this in a proposal on energy policy at the end of March.

Energy Research Is Shrinking

During the period 1975-1987 the state (in current currency value) has invested about 3,800 million kronor in energy research. Also in this area the idea is now coming through that the state should mainly support basic and long range

research in the colleges and universities, which is important for the power companies and industry.

Therefore, according to what NY TEKNIK has learned, the state investment in direct energy research will be reduced during the three coming years. The reduction, however, will not be felt during the first year.

Reduce Commissioned Research Work

According to Minister of Education Lennart Bodstrom, who is responsible for most of the government research bill, basic research will be strengthened. On the other hand, he wants to see less commissioned research work in the college sector.

He uses the terms "own program responsibility" and "commissioned research work" as near synonyms for the more well-known concepts "basic research" and "applied research."

It is even more confusing that the entire bill speaks of "information technology" even where it (generally) intends to say information technique, or only data processing technique.

The government is adding 360 million kronor to the research appropriation over the next three years. The lion's share of this will go to increase the faculty appropriation and strengthen the research council. The intent is mainly to advance recruiting and training of researchers and give them better working conditions.

One-Third of Research Funds to Education

About one-third of the state investment in research and development, or 2.9 billion kronor, is alloted to research and training of researchers under the budget of the Ministry of Education.

As background for this clear indication of the need for long range research, the bill states that one percent of all the world's research comes from Sweden. But we are better than that in terms of the quality of our research.

It is a feather in the Swedish cap that an investigation of how often Swedish scientific work is cited in research writings shows that Karolinska Institute is rated as number nine in the world. The University of Lund is in 24th place and Uppsala University is in 26th place in this ranking of the world's leading research centers.

Ageing

Now it is a question of ensuring a reasonable breadth in research, writes Lennart Bodstrom. Because of OECD's limitation on Swedish policies of research and technology, the government chooses to invest in the education of researchers. Other things can be limited, for example some of the projects under the Technical Development Board.

The concrete measures proposed are that the education grants for candidates for the doctorate be increased by 10 percent, to 88,772 kronor per year. During the entire three-year period about 700 new doctoral candidate appointments will be created. Faculties will receive "special means for reinforcement," and the faculties will be able to employ more research assistants. There will even be a little more money for the younger researchers' travel, etc.

Behind this investment in youth at the colleges is the awareness that the faculties are ageing at a rapid rate. Or in the words of the bill, "The expansion of the universities of two decades ago has now led to a distorted age profile, or 'collective ageing'." Therefore there will be many merit appointments (research assistants) within the humanities, social sciences, natural sciences and technical sciences.

63 Professors

A total of 63 new appointments of professors will be established during the coming three years. But the government adopted the concept of appointment of professors, and rejected the proposal of the UHA [Office of Swedish Higher Education] that this should be delegated to the faculties.

On 1 July 1987 three guest professorships will be established. One of them will be the Olof Palme Guest Professor, which will be aimed toward international policy and comparative studies of social institutions. Another appointment will concern artistic development work, and a third will be established "for an outstanding foreign female researcher."

More to Libraries and Research Councils

The basic resources of colleges will be strengthened by 112 million kroner, including the science libraries. On this item the UHA requested an increase of 10.4 percent, but got 9.5 percent. That means an increase of 3.4 million kronor for college libraries.

The research councils will get more to divide. The increase is 22.6 million kronor for budget year 1987-88 and 18.5 million kronor for 1988/90, in addition to compensation for wage and price increases.

In addition the government wants to invest in information technique, biotechnique and the humanities. The councils will decide on appropriations for up to three years, which will provide more long range planning for all. In addition, research on food will get increased funds.

In addition there will be an attempt to make college bureaucracy more efficient. This will mainly involve the administration of basic college education.

Half Is Commissioned Research Work

The colleges are advised to be more selective when they undertake externally financed research, which today amounts to 50-55 percent. This includes funds

from research councils, business sector organizations and other financiers. That share should not increase, but no exact ceiling was proposed.

Basic college education is now offered in 25 places. Permanent facilities for research exist at 11 colleges in 7 places. Research facilities will not be further split, but will be concentrated in these places (Stockholm, Uppsala, Linkoping, Lund, Goteborg, Umea and Lulea).

Amounts mentioned as increased funds for the colleges will be divided as follows:

	87/88 mil.kr.	Entire period 87/90 mil.kr.
Basic funds	69.34	120.90
Priority areas:		
Biotechnology	35.00	35.00
Information technology	16.20	28.80
Toxicology	3.00	6.00
Cultural science	8.17	13.09
Polar science	10.50	10.50
Other	6.50	6.50
Financing of studies	29.96	56.98
Research councils	25.11	43.61
Professors	7.20	15.20
Other	18.62	23.02
Total	229.60	359.60

Bodstrom also wants better reporting of activities from the colleges, such as better research statistics and better research information. SCB [Central Bureau of Statistics] will have subject statistics by the fall of 1989 at the latest, before the next research bill.

The major concern at the Ministry of Education is that the rate of passage through researcher training is strikingly low. About 2,000 persons per year begin such training. Half of these fail to complete.

In an effort to improve this situation as many as 700 education grants have been changed to doctoral candidate appointments, amounting to 57 million kronor over the three-year period.

There is a total of 17,100 trained researchers in Sweden, of which about 70 percent work in the public sector, usually as teachers and doctors. According to IVA [Royal Academy of Engineering Science] about 20 percent of civil engineers should be trained researchers in order to meet the future need.

226 Research Assistants

In order to improve recruiting, 120 appointments as research assistants are being created, 226 for the entire three-year period.

In the area of information storage, the DFI [Delegation for Technical and Scientific Information Storage] will be discontinued on 30 June 1988. A new library organization within UHA will be established at the same time, but it will first be examined somewhat more. It will be responsible for the system with the so-called accountability library. It is recommended that it receive 1.6 million kronor in 1988-89, and the following year 3.2 million kronor.

The psychological-pedagogical library is tied to the University of Stockholm library. The responsibility for the storage of business information "should not rest with state authorities, but with companies and organizations in the business community."

Public Employees' Side Lines

A surely rather controversial proposal was made concerning side-line employment of researchers. It is now recommended that it be obligatory that college teachers notify the college administration about "side-line employment of considerable amount related to their subject area."

Eight technical professorships are established in:
- information technology
- electronic system construction
- software technique
- control systems for industrial equipment
- workshop automation
- automatic data processing (two appointments)
- optical image processing, and
- computational linguistics.

For women's research and women researchers there will be 1.33 million kronor for the university and colleges at Lulea. This is an increase of .5 million kronor, including increased support for the KVINNOVETENSKAPLIG TIDSKRIFT.

Research on the handicapped is recommended to be coordinated by FRN [Coordinating Board of Swedish Research Councils]. Long range improvement of knowledge in this area will require a grant of at least five million kronor.

Environmental Center in Umea

A center for environmental science is recommended to be established in Umea by the university and FOA [National Defense Research Institute]. Later there can be a molecular biology laboratory at the same place.

The Institute of Space Physics will be the new name of the Kiruna Geophysical Institute.

Within the Ministry of Industry, support for research is the only large new investment in the area of micronics. The minister of industry describes it as a new and strategic area for industry.

Otherwise the investment areas of STU [National Board for Technical Development] are continuing as before and the Swedish technical attaches are getting their own appropriation in the national budget. STU wants the minister of industry to simplify the descriptions of what the management is doing in its programs under three main groups:

- New knowledge
- New techniques and
- New products.

Six New Basic Programs by STU

The following basic programs by STU will begin in the next budget year:

- cellulose-based multiple component systems
- metal-based fiber composits
- conductive polymers and their electrical properties
- biomaterial
- prospecting-oriented ore geology
- biomedical measuring techniques.

Beyond that there will be new basic programs in connection with the national information technology program. STU is expected to get 11.5 million kronor for that in 1987-88.

For STU's function as technical research council it receives 20 million kronor per year now. The government wants to increase that to at least 25 million kronor per year.

It is recommended that STU invest even more in the EC research and development program, especially in the area of standardization, which we should be able to influence.

The government wants to invest 12 million kronor during the next three years in the new area of micronics. That is a typical cross-disciplinary undertaking.

STU also wants its appropriations to be more long term, but the minister of industry does not agree with that now. First the testing of the new form of appropriations for administrative activities in a number of state agencies must be determined to be completed.

More Environmental Research

Research in environmental protection will, according to Minister Dahl, get a real increase of five percent in its appropriation. She will add 10 milliom to that for increased investment in research on pollution of the seas.

The appropriation for collective research in the environmental protection area will also increase by five percent. The state's share is, according to agreement, 10.1 million kronor, while the amount for the Organization for Research on Industrial Pollution increases to 11.8 million kronor.

According to these proposals the state will invest a total of 84.5 million

kronor on research on environmental protection in the next budget year, which means an increase of 16 million kronor.

The total state investments in research and development are still somewhat less than the business community invests in the same activity.

Budget Favors Technology, Regional Policy

Stockholm NY TEKNIK in Swedish 15 Jan 87 p 3

[Article by Eva Bingel: "Technical Colleges Avoid Cutbacks"; first paragraph is NY TEKNIK introduction]

[Text] Technical colleges will totally avoid any cutbacks in the year's budget bill. But neither will there be any economic enhancements.

The Ministry of Education has been forced to save almost 450 million kronor. It is the elementary and secondary schools which will be hit, while the colleges will largely escape cutbacks.

"Research and regional policies are priority areas in the government's financial plan. And the budget of the Ministry of Education is also influenced by this," said Minister Bengt Goransson.

Matters of research are not included in this bill, however. They will be presented in a special research policy bill in February.

The regional policy investment of the Ministry of Education is indicated by, among other things, the 15 million kronor earmarked for new educational programs and an increased number of spaces in colleges in priority parts of the country.

The college in Lulea will receive funds for more spaces for a so-called technical base year, and a new program in industrial economics with 30 spaces.

The university in Umea will get civil engineering training. A technical physics program will be started with 30 spaces for 1988.

Uppsala University will get civil engineering training, with emphasis on material techniques, which will be conducted in cooperation with the college at Falun/Borlange.

The college at Kalmar will get a new program, a machine shop engineering program of 80 points, which will be based on secondary school natural science and technical programs.

Beginner Spaces

There will be a total increase of civil engineer training with 85 beginner spaces, plus 60 new beginner spaces in two-year engineer training and 30 additional beginner spaces within college professional technical training.

The question of technical training at the middle level is moved into the future. A working group is being appointed in the Ministry of Education to study how this training should be introduced in the colleges.

It is further recommended that universities and colleges get increased responsibility for their localities and equipment. Starting in budget year 1990/91 colleges will get three-year frameworks for their budgets.

Later this spring the Ministry of Education will return with a proposal concerning the organization of colleges.

More Money for Support Areas

During the spring the government will present a special bill concerning food and research policies. It will deal with questions involving STU and the state industrial board, according to this year's budget bill.

Although environmental and energy questions are moved over to new ministries, the budget of the Ministry of Industry is increasing by 71.6 million kronor to 5,081.1. The investment in regional development is increased by 300 million kronor, "for investments in connection with the problem of structural change, improvements in infrastructure and competence." The costs of export credits have declined by approximately the same amount.

Behind these brief statements there is continued support for technical and development centers. So far about 10 of these have received 67 million kronor. Now it is said that regional political funds can also be used for such research and educational investments as are being made in Umea, Lulea and Bergslagen, among others.

It is further recommended that 15 million kronor be set aside for budget year 1987-88 for training at universities and colleges in areas of the country which have been given regional political priority.

New educational programs and more beginner spaces are planned at the university in Umea and the colleges in Falun/Borlange, Orebro, Kalmar, Karlstad, Lulea, Sundsvall/Harnosand and Ostersund. The proposal also includes increasing the appropriation for local and individual programs and separate courses.

Strong Support

The special investment for Norrbotten is continued, and last spring the decision was made for strong support for Bergslagen. The decision means that an additional 425 million kronor will be withheld for three years. Blekinge and Gotland have also enjoyed special additions, the budget writers point out.

9287
CSO:3698/319

RESEARCH DIRECTOR DISCUSSES CSSR CHEMICAL INDUSTRY

Prague TECHNICKY TYDENIK in Czech No 50, 9 Dec 86 p 3

[Text] For over 30 years now the Technological-Economic Research Institute of the Chemical Industry Prague has been helping to develop our chemical production. We asked its director Eng Dusan Dvorak, Csc:

[Question] Can you tell us what the main lines of development are in the chemical industry worldwide?

[Answer] First of all, it is striving for the greatest possible refinement of processed raw materials. This is a matter of utilizing almost all the components contained in them and making products from them which have a high use value and a price corresponding to that. This requires changing the structure of the chemical industry so that it produces what the others need. For example, it provides the developing electronics industry with new improved materials for the production of semiconductors, insulators, etc. Synthetic materials make it possible for the auto makers to design lighter cars; the lighter car understandably consumes less fuel. The extent and importance of research which discovers new products and production procedures for the chemical industry and helps it automate and improve them in effectiveness is growing in this process. It likewise assists in keeping the chemical industry from polluting the environment.

[Question] Our chemical industry also processes mainly crude oil. How can its consumption be reduced?

[Answer] First a clarification: almost all the crude oil we import goes through refineries. Ours here are considered part of the chemical industry, but that is not the case in some countries. At the same time, the majority of the output, roughly 85 percent of the products from the refineries, goes to the other branches of industry. This is mainly auto and air transportation. There is also agriculture, whose machinery consumes about 2 million tons of petroleum products annually. Construction is also a large consumer. The chemical industry itself processes only 15 percent of the products of our refineries. Technology changes are taking place in them which will make it possible to get more gasoline and the required products in the desired mixture from a smaller amount of imported crude oil. At the same time, our chemical industry must

also make better use of the products from the refineries, just as with all raw materials.

[Question] How highly refined are raw materials?

[Answer] Now we consume more raw materials than the world average for chemical products valued at $100 or gold rubles. Approximately 70 percent of the production expenses for our chemical products is made up of raw materials and energy. We must therefore make the chemical production processes more efficient and at the same time complete processing of the products into their highly valuable final products. I will give you an example: we produce the highest per capita amounts of epoxy resin in the world. But we produce the cheaper resins and import the more expensive.

But why have we not been able to produce the more expensive ones? And also process some of them into such valuable products of specialized chemistry as, for example, the epoxy adhesives which are being used more and more in modern production, as in engineering, for instance?

[Answer] Specialized chemistry is the production of chemical specialty products which have a great value for a small amount, at least Kcs 100 for 1 kilogram. In the developing countries where there is a great need for foodstuffs and the chemical industry is just developing, the growth is mainly in the production of artificial fertilizers and other mass-produced chemicals. But in the industrialized countries, the most rapid growth is in this specialized chemistry. For us this includes roughly 15 percent of our chemical products at this time, but we want to increase its share gradually to 25 percent. This of course requires effective capital investment, improved service, market research, and research as to everything for which a new product can be used. And customer information groups on how to work with the product.

[Question] How is our chemical industry reducing its energy consumption?

[Answer] At this time it consumes about 12 percent of the electricity which we produce domestically and is the greatest consumer of steam. The development of specialized chemistry where there is a need for less energy to produce the same value will make it possible for us to reduce this consumption. Cooperation with the Soviet Union is advantageous for us as we export to them special chemical products and import products which are expensive in terms of energy and raw materials. But it is also possible to reduce energy consumption in the other chemical production as well. For example, in the past 10 years they have reduced the consumption of steam abroad by half in producing the same quantities of some chemical products. Of course, this demands that we have better knowledge of the chemical processes, optimize the way they are run, get high-quality heat exchangers from engineering in the necessary quantities and varieties, etc.

[Question] Is the negative effect of the chemical industry on the environment being reduced?

[Answer] In the list of departments which are polluting the environment, the chemical industry is now in third place. But low-waste technologies could reduce the ecological consequences even more. In addition, it would also be a good thing for them since each bit of waste is actually a loss of raw materials which could be utilized somewhere! Chemistry also helps to improve the environment and produces materials required for waste water treatment plants, for removing harmful stack gases, etc.

[Question] What are the advantages and disadvantages of biotechnology?

[Answer] In the application of biotechnology, microorganizms perform for us those chemical processes which we otherwise do not know how to carry out at this time like, for example, the preparation of some antibiotics, or which we perform less effectively, for example the production of insulin. For the better utilization of biotechnology, however, it will be essential to set up an interbranch center. Why? The United Pharmaceutical Plants utilize biotechnology in the production of antibiotics; the chemical industry particularly in the production of citric acid; the foodstuffs industry in the production of baked goods, wine, and vinegar; city administrations in treating urban sewage; etc. A joint center would coordinate the exchange of their information and train worker workers for that field.

And another problem is that it will be necessary to prepare other biotechnological procedures and get the necessary equipment from the engineering industry. Microorganizms are specialized on one product in the majority of cases. Therefore however many chemical products we need, research will have to develop that many types of specialized microorganisms.

[Question] Tell us also how many chemical plants cooperate with the research institutes?

[Answer] The chemical industry is very dependent on research, including basic research. It therefore cooperates closely with the institutes of the Czechoslovak Academy of Sciences and with the higher chemical and technological schools in Pregue, Bratislava, and Pardubice. Our applied departmental research should be even more oriented toward the longest-range lines of development. But modern research requires modern instruments. Today these are being improved so rapidly that a new generation appears every 5 years, but the equipment of our institutes is mostly quite older.

And finally the biggest problem is that even the best new laboratory procedure cannot be applied to production without semioperational verification, but even semioperational procedures require equipment from our engineering industry. When we do not get it or we do not with difficulty buy it abroad, we have to produce it ourselves in the chemical plants, however inefficiently. This really slows things down!

[Question] I have also heard the opinion expressed that when chemical production began, as soon as a new procedure or product appeared it was easy to get the necessary simple equipment for its application in small-scale production. Now a new solution often means taking 5 years or more to build enormous, single-purpose equipment. And since the construction costs billions, it must be utilized for at least another 5 years, even when better production procedures are knwon. Everything in the chemical industry has been dragged out by this. Is this true?

[Answer] Only partially. Now there is mailly growth in the role of specialized chemistry whose production equipment is smaller, can be built more rapidly, and pays for itself faster. But the time from discovery to utilization can also be reduced in the other fields of chemistry as well. But this demands that research and development come up with solutions which are really at the top level of quality. It will likewise be necessary to improve the quality of design and to use new computer methods more in the process. For example, systems of piping designed in this manner can be up to 30 percent cheaper to produce and at the same time more functional. Abroad they often design the chemical equipment as a separate item and it is not necessary to construct buildings. The engineering industry should standardize the components of chemical equipment more, such as valves and pumps. This makes it cheaper to produce them, speeds up assembly, and simplifies maintenance. And finally there is a need to speed up the acutal construction and assembly.

[Question] Further international division of labor will surely also increase the efficiency of our chemical industry.

[Answer] Our engineering industry produces 70 percent of the worldwide engineering inventory; our chemical industry is better at this and produces only 50 percent of the worldwide assortment, but even this is too much. It is necessary to intensify further the division of labor in research and in production between the socialist countries and at the same time to do away with obsolete and inefficient operations. These should be replaced by the production of an agreed-upon inventory in highly efficient operations, for example those where the production process is controlled to an optimum degree by computers. Where it is to our advantage we should also purchase more licenses from the capitalist countries and at the same time increase the export of our licenses. Of course, this requires more rapid semioperational verification; no one will buy an untested laboratory design from us!

[Question] And in conclusion?

[Answer] The chemical industry has a great future globally and in our country. Of course, in order for it to develop successfully here it is essential that we thoroughly fulfill the directives of the 17th CPCZ Congress to utilize and refine raw materials better, to manage energy well, to limit negative ecological effects, to speed up research and development, and to cooperate closely with the other socialist countries.

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NEW CHEMICAL MATERIALS DEVELOPED IN BULGARIA

Need For New Materials

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 p 4

[Article by Nayden Naydenov, expert, Council of Ministers Economic Council]

[Text] "The building of capacities for the production of contemporary polymer materials for construction--polycarbonates, polyamides, high-molecular polyethylenephthalates, fluoroplasts, fiberglass, aramide and carbon fiber and various other compound materials must be accelerated. The production of plastics must increase in volume and variety; priority must be given to the development of modified and new construction varieties and the level of processing of raw materials into finished goods must be increased" (from the theses of the 13th BCP Congress).

Chemical companies in the advanced countries are developing and applying new products and processes in order to make more efficient use of nonrecoverable natural resources. Such new materials help to solve some of the problems of economic development in some countries. Their governments finance programs for scientific research in this area, using special polymer membranes, electric-conductor high-crystal polymers, compound materials and biotechnological products. The structure of capital investments of the leading companies throughout the world is changing as well. Most of the funds go not into traditional chemical production but into scientific development. The purpose is not only to develop but to apply new materials with improved properties and different or improved quality indicators. This is achieved through modifications, development of polymer mixtures and alloys, compositions, polymer concretes and foamed plastic. It is desirable for the to lower the production cost of the necessary products. Here are some of the latest achievements:

Some of the new electric power conductors change their color according to the tension. This makes them usable in a variety of screens and color television sets;

Synthetic membranes can process liquids and gases with less power. Polymer products are applied in medicine and biotechnology;

Lacquer-dyeing materials perform anticorrosion, protective lining and decorative functions. Improving their quality indicators is an important task, bearing in mind the scarcity of raw materials (vegetable oils, and monomers for high-quality filming agents and some pigments) and restrictions on toxic products. New lacquer-dye materials consisting of film-forming substances are being developed. They are water-soluble and can be used in suspensions and emulsions, with faster hardening, eliminating the use of organic solvents, thus ensuring environmental protection. Silicon-containing lacquers and dyes provide coating resistant to various influences. Polymers consisting of monomers (such as trialkoxylane) with branched chains are being suggested for the protection of spaceships. They form coatings which can withstand high temperature changes ranging from minus 100 to plus 70 degrees centigrade in a vacuum environment. The lacquer-dyeing materials based on silicon polyester yield a high share of dry residue and can be wettened and spread well. They are used in the application of long-lasting lacquer coating;

The new types of elastomers have better physical and mechanical indicators and greater resistance to oil, heat and wear; this improves the functional qualities of the goods made of them;

The requirements concerning chemical staples are resistance to heat and fire, tensile strength and flexibility. These qualities make them usable in a variety of areas in reinforcing materials and for other technical purposes, in flying, consmonautics and medicine;

The intensive development of electronics, microelectronics, optoelectronics and laser technology require the production of new chemicals and materials for semiconductor instruments, integrated circuits, printed circuits, photoresistors and indicators;

Industrial and special ceramics are needed in the nuclear power industry, electronics, data processing, and the aerospace industry, in developing the resources of the sea and in medicine.

In the future, the new raw and other materials produced by the chemical industry will contribute to the development of technical progress. Their number will be steadily increasing and their quality will be improved, so that they may meet the growing requirements of consumers in most different areas.

The main trend in the industrially developed countries is to increase the production of so-called "qualified chemistry" products and to restrict the development of high-tonnage production. The concept of "qualified chemistry" is frequently invested with different meanings. In the majority of cases, however, this applies to small and medium-sized enterprises using skilled labor in scientific research and development.

In the years to come, the Bulgarian chemical industry will follow the trends which are becoming apparent in the advanced countries. The main task will be to provide materials in order to accelerate the country's economic development. New products and items will be obtained through repeated processing of primary raw materials.

We shall develop most rapidly technologies for the production of purer quality goods needed in the micro-and optoelectronics and laser technology. Capacities will be developed for the production of polycrystal silicon, chloroxylene, and a variety of silicon products, such as resins, oils, lacquers, rubbers, and auxiliary materials. The production of new high-quality polymer products will be mastered.

Polymer Lab, Sofia University

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 pp 4-5

[Article by Engineer Mira Mayer and Marusya Petrinska]

[Text] Honestly speaking, as we were walking up the six floors of the chemistry department, Sofia University, we were thinking thoughts such as "What kind of laboratory is this, stuck all the way up next to the roof of this building?" For some reason, attics always lead to such flighty and more artistic than scientific "impressions."

Nevertheless, in the interest of truth, we must acknowledge that all such considerations disappeared the moment we entered the Sectorial Polymer Scientific Research Laboratory (ONIL) of Sofia University. It was as though the purpose was immediately to make visitors realize that serious scientific work is possible also in an attic as soon as they enter the neat reception room, converted into an exhibition hall. The numerous charts, photographs, authorship certificates, patents, scientific works and popular science books, textbooks and polymer items exhibited here clearly prove the considerable achievements of this small collective which was organized some 2-3 years ago.

The collective of this most modern laboratory consists of no more than seven people, including the manager. Our preliminary investigation, however, had revealed that Docent Dr of Chemical Sciences Stoyko Fakirov had selected very carefully his few associates. A number of facts and figures indicated in the exhibited diagrams proved that his selection was quite good and that the laboratory personnel had been able, in these few years, to add substantial results to the long experience of their leader in the area of polymer science. They told us that the polymer ONIL of Sofia University is in close touch with Moscow State University, the Technical University in Loyna-Mersenburg (GDR), Hamburg University (FRG), University of Delaware (United States), Athens University, and others. The scientific output of the collective includes 26 authorship certificates, two patents registered in the United States, about 100 scientific articles, most of which published in international periodicals, one monograph, popular science books, textbooks and university student manuals.

Leading among the Bulgarian partners of the laboratory are the D. Dimov Chemical Combine in Yambol and the Accelerated Application Center (Gara Iskur) of the Construction Polymers Combine in Elin Pelin. Together with its colleagues in these two units, the polymer ONIL collective has developed new technologies for the manufacturing of a number of construction polymers through the modification of two widespread polymers extensively produced in

the country: polyamide (vidlon) and polyethyleneterephthalate (yambolen) and some byproducts of their manufacturing.

Actually, specified Docent Fakirov at the beginning of our conversation, we have discovered a new polymer. We are working to expand the application of such well-known polymers by changing some of their properties through additional processing. This applies to the following: The granules produced at the Vidin and Yambol chemical combines are actually polymers with a very high molecular weight and are suitable only for the production of synthetic fibers. In order for those same polymers to be used in the development of a variety of construction parts and other materials by casting under pressure or extrusion, their molecular weight must be increased. We developed industrial technologies for the additional solid-phase polycondensation of polymers with a lower molecular weight in vacuum, at high temperature. After such treatment, they can already be processed by casting under pressure, as I mentioned, or through extrusion. They will find a broad application in electronics, electrical engineering, instrument making and the light and food industries.

The only polymers we consider "ours" are the thermoplastic elastomer and the polybutyleneterephthalate. The elastomer is produced by only two other companies in the world and, unquestionably, this is a success for Bulgarian science. The technology for synthesizing polybutyleneterephthalate is the first of its kind developed in the socialist community. These two polymers will find adequate use in various sectors as substitutes of expensive imported raw materials.

As to the practical application of the new technologies developed by the laboratory collective, Docent Fakirov spoke mostly in terms of the future. This is no accident. For the time being, the only applied laboratory development has been the high-molecular polyamide. The raw material for its production is provided by the Chemical Combine in Vidin. The additional processing--the solid-phase polycondensation in vacuum at high temperature--is taking place at a small enterprise in Gara Iskur, especially built for the purpose, on the basis of a short-term loan granted by the BISA. The thus obtained high-molecular polyamide is shipped to Elprom in Lovech and used in the production of drill handles. This has replaced an expensive imported raw material and the expected annual savings will be about 1 million leva in foreign currency.

What about the other developments? As you may have guessed, they are still "waiting" for their turn to come and still "hoping" that economic managers will show some initiative. Here is an example.

Most of you have probably faced the annoying need of properly washing and returning empty cooking oil bottles, or else have been unpleasantly surprised and, sometimes, injured on a hot day or if shaken a little bit too much, a bottle containing a carbonated drink would explode in your hands.

That is why it is natural for most major companies in the world producing nonalcoholic beverages and other liquid foods to use polymer discardable containers.

One of the developments of the polymer ONIL is the high-molecular polyethyleneterephthalate, which has precisely this quality: it can be used in manufacturing bottles for the food industry. Furthermore, the small enterprise in Gara Iskur can also assume the processing of the polymer produced in Yambol and convert it into shells (semifinished polymers which, with heating and blowing, in a fraction of a second, turn into bottles of the desired form and size).

Thus, this small enterprise can produce such shells and supply enough such materials to several bottle manufacturing shops in neighboring okrugs. This avoids the hauling of air in empty containers, which is economically inexpedient. Furthermore, such containers are safer and more practical (the bottles will have screw-on caps and protect the beverages from turning flat if not immediately used). This will also avoid the waste of finished goods caused by breakage. As you can see, the advantages are numerous. But what then?

As you know, no such bottles are found in our stores selling carbonated drinks or cooking oil. The main reason is not the lack of desire on the part of the Nonalcoholic Beverages and Mineral Waters SO, the Central Cooperative Union and the NAPS Association (which are quite favorably inclined to use this idea) but...shortcomings or, bluntly stated, the lack of initial raw material. Indeed, the chemical combine in Yambol is producing said polyethyleneterephthalate but the existing capacities can meet only its own production of synthetic fibers which are equally needed by the national economy. The likely solution is either to expand the Yambol combine or to build a new enterprise or else to import the raw material, payable with certain quantities of semi-finished polymer for which we have developed the technology. Numerous choices exist. All that is necessary is greater efficiency and flexibility.

This also affects the pride of the laboratory--the methods it has developed for the production of thermoplastic polyetherester and polybutyleneterephthalate. For example, polyetherester is as good as Hitral, produced by Dupont in the United States. As we pointed out, for the time being we are the third country in the world which can be able to produce this item. The point is that the other two countries are indeed producing it. Furthermore, in all likelihood several laboratories throughout the world are making efforts to develop it. Therefore, our advantage may soon be lost unless we act rapidly. It is expected that very soon the competent authorities in the chemical industry will decide whether this raw material will be produced locally or else whether we shall continue to import it.

Polyethylene Bottles

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 p 4

[Text] Shortly before this material went to press, we learned that a coordination conference had been held at the NAPS Association, attended by representatives of 12 chemical and food industry departments and the DKIT. The topic under discussion was the future of nonreusable polymer bottles. On

the telephone, Engineer Venelin Markov, chief specialist at the NAPS Association, who coordinated the conference, told us the following:

The suggested technology offers a number of advantages and, unquestionably, will be used. Initially, the polymer bottles will be used in the production of carbonated nonalcoholic beverages and, later, for cooking oils. Representatives of the DKIT promised to provide even before the end of this year 200 tons of raw materials for the needs of the NAPS. As of next year, the chemical combine in Yambol will begin to supply 1,000 tons of polyethyleneterephthalate annually, which will make possible the manufacturing of 25 million liter-size bottles.

New Polymer Enterprise

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 p 5

[Report by Niki Davidov]

[Text] A small enterprise for modified polymers of the TsUV of the Construction Polymers Combine in Elin Pelin was opened on 1 October 1986 at Gara Iskur, in Sofia. It contains the first Bulgarian universal vacuum-drying installation for the modification of polymers produced by a West German company. The two rotation cones are used for the additional solid-phase polycondensation in vacuum of polyamide produced at the chemical combine in Vidin (known as vidlon). The system is controlled by a microprocessor which receives electronic data. Shown on figure 2 [not included] are Engineer Yordan Atanasov (right) and Engineer Iliya Iliev, reading the instruments on the control panel. The process is fully automated and applies wasteless technology. The initial data are introduced first, such as the heating and cooling temperatures and the duration of the two processes. Subsequent to the polycondensation in vacuum, a polymer with a higher molecular weight and increased strength is obtained. The olygomers, which are toxic to the human body, are eliminated.

High-Viscose Polyamide

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 p 5

[Article by Tsvetan Georgiev, Vidin Okrug correspondent]

[Text] After several years of persistent research, the collective of the Institute for Polyamide Fibers and Air Tires of the Chemical Combine in Vidin, and the Lenin VMEI in Sofia developed a new construction polymer. Its qualities are superior to polymers produced by leading companies in the FRG, France, Switzerland and other countries. It is known as "high-viscose polyamide-6." It can be successfully used in machine building, and the electrical engineering, mining and food industries.

The new construction polymer is processed through casting under pressure or extrusion, and is protected with an authorship certificate. The applied technology guarantees a minimal amount of waste. The parts are easily removed from the shaping tool, which accelerates casting.

Last year, the chemical shop at the combine in Vidin produced the initial quantities of this promising polymer material which could replace metal. This will save millions in foreign currency for the state by stopping imports. The annual output is 127 tons but only about 100 tons have been sold. Savings for the Vidin Combine alone have amounted to some 200,000 leva. Savings in two of the country's enterprises which have made various parts from this material have totaled 381,000 leva.

Hardly any other proof is needed in favor of the extensive use of this Bulgarian polymer. What is happening in reality?

The Vidin Combine's plan for this year calls for the production of 300 tons of high-viscose polyamide. Engineer Genadi Tomov, the chief of the chemical shop, specified:

Our capabilities are much higher. This year we could produce 1,000 tons of high-viscose polyamide. However, we take into consideration the marketing of the output and consumer demand. This means that the potential of the system is not used and it is left to idle hours and days on end. Obviously, the consumers are unable to reorganize their production and continue to use imported raw materials despite reciprocal advantages in using this material.

Who are the consumers? They are many: the Proma DPP in Madan, the Spare Parts Plant in Vratsa, the Tikh Trud Production Enterprise in Khaskovo, the Malchika NPK in Sofia, the Telephones Plant in Belogradchik, and the Progres SPP in Pleven. Interest has been shown by other enterprises as well, such as the Momina Krepost Plant in Veliko Turnovo, the Electric Telphers Plant in Gabrovo and the Asenova Krepost KPP in Asenovgrad.

On the surface, it may appear that dozens of enterprises could use the high-viscose polyamide. However, the precise answer as to the situation was given by Engineer Nikola Donchev, director of the Khimsnab Vidin branch:

"So far, requests for this raw material for 1987 have been minimal (about 100 tons). The consumers are virtually unchanged. An interest is shown by others as well, but they are asking for colored high-viscose polyamide. Because of signed contracts, they are continuing to import this expensive material from abroad.

Should the polyamide be dyed at the plant? Yordanka Mizova, from the institute in Vidin, and co-author of the invention, explains:

There is no need to dye high-viscose polyamide in the course of its manufacturing. If this is done, changes in the technology will take place and the qualities of the product may change as well. It is easier and quite reliable for the polyamide to be colored when cast or extruded. This is well known to all specialists in the country who are using imported polymer. There would be no difficulty in procuring various dyes for each specific item.

A some kind of "magic circle" develops: Capacities for the production of high-viscose polyamide are idling while the country is importing this material.

It would be difficult to find a more accurate answer to this question other than the fact that the managers of producing enterprises are taking exclusively their own interests into consideration and fear any eventual risk. They are "assisted" in this by linking their plans for material and technical supplies to imports.

Should this be the case?

Comment of Editorial Board

Sofia TEKHNICHESKO DELO in Bulgarian 7 Mar 87 p 5

[Text] Despite all the decrees and resolutions passed on the more extensive use of polymers for construction purposes, this initiative still remains entirely in the hands of those who have created them rather than those who need them, such as enterprises in the machine building, electronic, electrical engineering, light and food industries. On the other hand, however, the producers show no great interest in the problems developing in the use of their products by enterprises. There are no legal regulations, publicity or adequate information on the new materials. No written documentation is available. The responsibility for this must be assumed by the producers, the DKIT and the Biotechnological and Chemical Industry Association. Perhaps the greatest culprits are the managers of consuming enterprises, who fear to assume a certain economic risk, to abandon the use of imported polymers and use Bulgarian materials. Mistrust in domestically produced materials costs foreign exchange and the price is sometimes double. Such mistrust is totally groundless, for the quality of the materials is not only not inferior but occasionally even superior to imported goods.

5003
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HUNGARY: SELECT FIRMS AWARDED RIGHT, SUPPORT TO IMPORT COMPUTERS

Budapest HETIVILAGGAZDASAG in Hungarian No 9, 28 Feb 87 pp 4-6

[Article, with two inserts, by Zoltan Tompe: "A Simulated Market; Competition For Computer Import"]

[Text] A few days ago the domestic market for professional personal computers (PPC) was boiling without central invervention, developing we might say according to the laws of the jungle. But the National Technical Development Committee, the National Materials and Price Office and the Ministry of Industry made public that within the framework of a competition--which would award convertible import possibilities to the winners--they would try to create new conditions and cheaper prices. The author of our article dissects the market effects of the new package of measures below.

At the beginning of the 1980's, independent of government programs or central resolutions, a flow of microcomputers into Hungary began spontaneously. At that time the domestic computer market was still characterized by "If you say computer, I say 8-25 million forints." A new epoch began overnight when devices which could be regarded as computers came on the market from private import at prices around 150,000-250,000 forints. Not much later domestic personal computer models appeared as well. Within a few years about 50 different types of domestic microcomputers, or more precisely computers assembled here at home, appeared on the market.

For long years there was no word about organized import of microcomputers. At first the only acquisition channel was private import. Tens of thousands of micros, primarily Commodore-64's, reached the country through this channel. Some officials regarded the rocketing growth as a success of the government electronics program. But the only supporting measure from the government in regard to micros--and this born only of great pressure--was to reduce the duty on machines imported for one's own use from 30 percent to 15 percent. This was certainly a positive measure, but it did not help the users of professional machines a bit.

The situation changed when it became more generally obvious that there were many things you could not do with a Commodore-64. Then the PC-XT and later the PC-AT "fever" began. These were truly professional devices with possibilities greater by orders of magnitude than their predecessors. Seeing their

tempestuous spread in the West and plunging prices many felt that fantastic business possibilities hid in this machine category. A series of Hungarian small cooperatives were formed which within a short time won a significant share of the domestic professional PC market. Many prospered; the shortage, self-evidently, created an opportunity for extra profit. And the small cooperatives were offering machines a good bit more cheaply--at a price around 300,000-500,000 forints--than the domestic manufacturers. And in many cases Hungarian "manufacture"--even at well known large enterprises--meant that they put a Hungarian firm name on machines assembled from parts imported from the West. There was even a well known firm which didn't even bother to do that but simply put its own emblem on computers manufactured in the Far East.

In this situation and on the basis of last summer's decision of the Economic Committee the National Technical Development Committee (OMFB), the National Materials and Price Office (OAAH) and the Ministry of Industry thought that the time had come to restore order and reduce prices, and to provide the foreign exchange to do so. They announced a competition for domestic computer manufacturers. According to our information they promised the winners a total of about 5 million dollars from which they could cover the very considerable import needed for the computers they manufacture. The requirements of the competition were as follows. They must manufacture IBM compatible computers--with an ever larger domestic added value--in quantities fixed in a contract with the OMFB. They must provide a guarantee and quality service for these machines. And what is most important, they must sell the machines for about half the present prices.

Winners of the PC Competition

Firm	Number * of Units	Fixed Sales Price (1,000's forints) PC-XT type	PC-AT type
Videoton	1,200	180	260
Proper Association	1,200	129	215
PerComp Association	800	170	220
Csepel-Transelektro-Ramovill Association	500	159	213
MTA SZTAKI COSY **	300	130	195

* They contracted with the OMFB to deliver this many computers at the fixed price.

** The Computer Systems subsidiary of the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences.

The competition, however, was not an open one. The organizers sought out separately those enterprises they "counted on" to apply. Of course, in accordance with the good old Hungarian custom, everyone immediately learned of the matter, but most of them only by chance. The whole profession was astir, more and more rumors spread, and no one expected anything good from the "secret action." The prolonged evaluation of the 12 entries increased the uncertainty. For long months, right up to 10 February, there was no official information. Then the OMFB announced the results. The five winners were:

--Videoton,
--the Proper Association,
--the PerComp Association (an association of six small cooperatives),
--the COSY subsidary of the MTA SZTAKI, and
--the Csepel Elektronic-Transelektro-Ramovill association.

The OMFB estimates this year's domestic demand for professional PC's at 4,000-4,500 units so it signed contracts with the five winners for delivery of a total of 4,000 units. It also set the convertible exchange allowance available for import accordingly, encouraging the manufacturers to acquire what they could elsewhere than from import. (The contracts signed with the firms are valid only for 1987; the announcement of a new competition is expected for next year.)

In the wake of the respectable goals of this competition one can hope for improvement and a reduction of the price level. But there are a few circumstances which are thought provoking and to which we would like to call attention.

--In general an authoritative price is not a good substitute for market price competition. It might have been better if the prices had developed basically in market competition.

--If only the domestic manufacturers have the money available for import (or a significant part of it) then the possibility of import competition is ruled out. Obviously a domestic firm will not compete with itself by importing a finished machine which is cheaper than its own. And without import competition it is doubtful if the prices will really fall lastingly to the level expected.

--Last year about 4,000 professional PC's found owners in Hungary. If the prices this year really fall to one half then it is virtually certain that demand will exceed the 4,000-4,500 units estimated by the OMFB and a shortage will develop. But the contracts and import allowances of the winners pertain to a total of 4,000 units only. The missing volume will get into the country somehow--e.g., as parts--but obviously will not cost the same as the machines purchased within the framework of the OMFB competition. Of course all this is only presuming. But it is certain that whether domestic demand was well estimated or not it would be better if the manufacturers could accomodate to demand.

--It appears that the competition does not solve the acute computer peripheral and software problems. It is as if they had forgotten about these again. So where will the money come from for the indispensable imported peripherals? It will probably come from where it has been coming from. With unchanged conditions and at unchanged--that is, expensive--prices. And what about applications software, trade in which is rather low under domestic conditions? Since it is probable that the 4,000 relatively cheap machines being manufactured here with OMFB support will not cover the needs it is not unimaginable that there will still be tie-in sales within certain limits. Will a manufacturer sell a cheaper machine to someone who has peripherals or applications software?!

Despite the greatest expertise of the authorities the requirements fixed in a competition announcement are not perfectly identical with the needs of the customers. Of course they may coincide. In the case of the present competition--presuming good intentions--the main problem may be that they are trying to develop a favorable economic environment artificially, to simulate one. But it is not the same thing to bicycle along the highway and peddle an exercise bike in a room. Not even if we hang on the wall a poster depicting a forest. The prices developing in the wake of official measures (even when taking the form of a competition) are not competition prices--whatever they may be--but rather are authoritative prices simulating competition prices. And on a simulated market the enterprises only simulate competitive production, and behave like the soldier in the anecdote. Before the maneuvers the commander put a sign on a bridge saying: "This bridge has been blown up." During the exercise the commander was stunned to see a platoon of soldiers happily sauntering across the bridge, paying no attention to the sign. When he looked more closely through his field glasses he saw that they were wearing signs--"We are swimming."

[First insert, by Peter Szauer: "The PerComp Opinion"]

[Text] One of the five winners of the OMFB-Ministry of Industry-OAAH personal computer competition was the PerComp Developmental Deposit Association formed only a few months ago by six small cooperatives (Applications Technology, Controll, Data Manager, Microsystem, Instrument Technology and Szamszov) and the Hungarocoop cooperative foreign trade enterprise. What is your opinion about the market possibilities and the PC prices? we asked, among other things, of Gabor Szeles (42 years old), president of PerComp and Instrument Technology, and Peter Vadasz (42 years old), vice president of the association and chief engineer of Microsystem.

Interviewer: A few days ago it was made public that PerComp was one of the winners in the PPC competition. What will you do now with the OMFB dollars?

Gabor Szeles: The contract between PerComp and the OMFB fixes our fundamental tasks. The most essential point is that we have undertaken to manufacture 800 PC's at a fixed price. These computers will be marketed uniformly under the trademark PXT or PAT. Up to now the member cooperatives of PerComp have sold various types but from now on they will be on the market with a uniform offering. When we learned of the PC competition we felt that separately we had no chance against Videoton or the SZKI. This prompted us and our former competitors to form PerComp which, with a turnover of about 2 billion forints last year and more than a 50 percent share of the market. is a significant factor on the domestic professional PC market.

Peter Vadasz: Decision makers still see greater security for their money with large enterprises than with small undertakings with little interest representation. This is true even if we are no longer surrounded by an atmosphere of doubt and suspicion but have become, according to many signs, socially acceptable. Returning to your question, we have not changed our goals in the new situation. We continue to want to be the cheapest on the domestic market for IBM compatible PC's and we want to prove that machines can be manufactured economically here also if they suit the circumstances. The

computer technology small cooperatives have already had a beneficial effect on the market. In the past 2 years the price of professional PC's has plunged from 2 million forints to under 400,000 forints.

Interviewer: But even this is far from the 2,000 dollars or about 100,000 forints which is the average price for a professional machine abroad. How did this high domestic price develop and how will it change now under the new conditions:

Peter Vadasz: A number of subassemblies for computers can be obtained only for convertible exchange. The so-called compensation dollar used for purchasing thus far cost 130-150 forints. In addition, we generally assume installation and a one year guarantee for our machines, and this has a high cost factor. And then I still have not mentioned the profit of the middlemen, who for the time being cannot be eliminated; so by the time a machine reaches Hungary it is a good bit more expensive than the forint sum corresponding to 2,000 dollars. So the domestic prices can be reduced drastically only if at least one of the factors listed above changes.

Interviewer: So can we count on a drop in prices or not?

Peter Vadasz: I am convinced that having the "OMFB dollars" the machines will be cheaper. And there will be a demand for proportionally greater numbers. Last year roughly 3,500 professional PC's went on the domestic market, 2,000 of them sold by members of PerComp. I estimate that at the cheaper price one could sell 8,000-10,000 units this year.

Interviewer: Does this mean that there will be PC shortage this year? Or does it mean that parallel prices will develop, so the cheaper machines will be available in limited numbers and when they are used up the same machines will be available more expensively?

Gabor Szeles: Certainly the danger of the development of parallel prices exists, at least for the subassemblies purchased. Of the 12 subassemblies for the PXT machines of PerComp we manufacture eight here at home and import four. In the case of the AT category machines we are able to manufacture six of the 11 subassemblies and we must obtain five from abroad. The Winchester disk, the floppy disk drive, the keyboard and the monitor come from beyond the borders. PerComp has received an opportunity to produce 800 cheap machines, but it could produce and sell 4,000 per year. We will try to produce the 4,000 machines.

Interviewer: Are you capable of manufacturing PC's of suitable quality?

Peter Vadasz: Six years ago there was hardly any computer engineering industry on Taiwan. Last year the small enterprises there exported computers for 2 billion (!) dollars. As I understand it they do not maintain themselves from state supports, and probably they are not much smarter than we are.

Gabor Szeles: I am convinced that because of the geographical position of Hungary and production costs in computer technology which can be regarded as relatively cheap we could compete in some computer subassemblies not only on

the socialist market but also on the market of the Western European countries with the similar products of many Far Eastern firms. Of course this will not happen overnight and it can involve only carefully selected subassemblies. Things which can be manufactured economically in small series. I am thinking, for example, of the coupler cards of Instrument Technology used for computer networks. In any case we are now implementing, from our own sources, an investment worth about 100 million forints; in our new plant we will produce this year 2,000 PC's and 5,000 terminals used in local networks.

Interviewer: To what do you attribute the successes of Instrument Technology and Microsystem?

Gabor Szeles: I and one other founded Instrument Technology in 1981. Since then our turnover has increased 600 times to 600 million forints; last year we employed 65 people. We have always tried to satisfy the wishes of the customers. We feed a large part of our profit back into development and manufacture and every year we are on the market with ever greater capacity. And one thing more--we always strove for the best quality.

Peter Vadasz: In 1983, the year it started, MIcrosystem achieved a turnover of 5 million forints with 15 people. Last year there were 80 of us and turnover was 620 million forints. We have no secret formula; we took on only tested workers and we paid them according to their performance. We got into new developments ahead of the competition, and 70-80 percent of these were successful. We did not maintain deficit activities for prestige reasons. We try to hold on to customers once acquired. What can only be done so we have made by subcontractors and we do not superfluously discover things which others already know.

Interviewer: Finally, with what sort of profit do you work?

Peter Vadasz: In the United States a profit of 30-40 percent is not rare for "going" firms. Here there is such profit only in very well written program systems and software which can be sold many times. The profit in hardware manufacture and assembly is around 15 percent. To be completely concrete, Microsystem made a profit of 110 million forints last year and Instrument Technology made a profit of 80 million forints.

[Second insert, unsigned: "A Primo for 2,700"]

[Text] Last week Elektromodul was selling its in-stock Primo computers for one tenth the original price, at a price of 2,700 forints. At the Budapest shop of the firm on Mari Jaszai Square--the action took place only in this shop--they sold 2,000 units in 3 days and the last Primo was sold on Tuesday of last week. Several thousand got nothing for their pains, including many who had come in from the provinces at news of the clearance sale. The majority did not want to understand, the action is over, the warehouses are empty.

"The final clearance took place," said Jozsef Simon, an Elektromodul department chief, in answer to our question, "because in the past year or year and a half the Primos proved unsellable at the earlier prices." Manufacture of them began at the end of [the date 1948 is crossed out; presumably 1984 was

intended] at the New Life Producer Cooperative in Sarisap on the basis of SZTAKI plans. At that time the computer together with power unit cost nearly 29,000 forints in the shops of Elektromodul. This was considered a relatively cheap price at the time, they said at Elektromodul, and at first the machine sold well. Due to a cooling of the original interest the Primo was marked down several times, first to 16,000 forints and then to 12,000 forints. Despite this by the end of 1985 nearly 80 million forints worth of Primo's were gathering dust in the warehouses of Elektromodul. Up to the beginning of the present action they had succeeded in selling only about 5,000 of them. But (as the example shows) there is a demand for the machine at the present price of 2,700 forints--which many consider an unrealistically low price born of desperation. So this action indicates that in Hungary if expensive computer technology suddenly becomes attainable there will be truly mass interest in it. Even if the Primo is now obsolete from most points of view--it is incapable of color display, there is a poor supply of software for it, and it is not compatible with any other machine.

8984
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HUNGARY: MODEL CAD/CAM SYSTEMS BEING DEVELOPED

Budapest HETIVILAGGAZDASAG in Hungarian No 10, 8 Mar 87 p 8

[Text] A hundred invited guests, primarily industrial enterprise leaders, participated on 26 February at a conference at which representatives of the Ministry of Industry reported on the results of an initiative started last year to aid domestic use of computer aided design and manufacture (the widespread English abbreviation is CAD/CAM) and on the future plans. The ministry is trying to bring together existing domestic CAD/CAM capacity and research results and to this end the ministry is offering about 160 million forints in support for the creation of so-called model systems. An agreement was reached in 1986 between the Central Physics Research Institute (KFKI) of the Hungarian Academy of Sciences, the Computer Technology and Automation Research Institute (SZTAKI), the Budapest Technical University (BME) and Videoton concerning a uniform CAD/CAM system structure. At the conference it was noted that three CAD/CAM model systems would be prepared at the KFKI in the first half of 1987. One will go to the BME for industrial machinery applications; the second will be a research and development system at the SZTAKI; and the third will be put into operation at the Electrocoop industrial cooperative for power industry and other non-machine industry purposes. This year the KFKI will manufacture an additional 10-12 systems--costing about 50 million forints each--for industrial use. Within the framework of the model system program the technical university intends to create an innovation park which will offer a research and development infrastructure for technical research.

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HUNGARY: MINISTRY URGES CAD/CAM ADOPTION, INITIAL STEPS TAKEN

Budapest NEPSZAVA in Hungarian 10 Mar 87 p 5

[Article by Pal Molnar: "Nourished Creativity"]

[Text] "The proof of the pudding is a simulation," it was said at the recent professional day meeting. With the spread of computer aided design and manufacture--CAD/CAM--the principle that a new solution must be subjected to the test of practice may be overthrown. With more and more electronic products it is possible for a computer to simulate the processes--a good bit more quickly and more cheaply than with a practical test. Thus possible mistakes can be eliminated in the designing stage.

A number of enterprises remain at the designing stage in the introduction of CAD/CAM computer methods. The Ministry of Industry wanted to give a boost to this slow process by organizing the professional meeting. The competitiveness of our industry depends in large measure on whether a computer aids the work of the designers and whether a computer harmonizes the production processes.

Many in domestic industry have now recognized the significance of computer design and organization according to one of the talks at the meeting. Computer aided engineering creations and manufacture with numerically controlled machines appeared in some Hungarian enterprises in the mid-1960's. And later a number of good technical initiatives, modern at the time, were taken--without being followed up and exploited.

Successes, Sporadically

Today--as was made clear at the meeting--the programs and competitions of the Ministry of Industry, OMFB [National Technical Development Committee] and Academy are giving good impetus to the spread of model systems, developmental undertakings and even wider industrial applications. The intention is for the scientific and the production results to manifest themselves in harmony, strengthening one another, and not appear sporadically. Partial successes, although they bring international recognition to this or that work group, are not useful enough from the viewpoint of industry as a whole.

Receptivity--this word was voiced many times in various connections at the meeting. The receptivity of industry as a whole came up at the Central Physics Research Institute (KFKI) too, where Andras Szep, a colleague at the

institute, said that the appearance of an industrial demand for CAD/CAM methods coincided with the appearance of the TPA 11/500 computer family on the market. These computers of the KFKI already satisfy the requirements made of large CAD systems. In the majority of such systems around the world they use similarly "talented" VAX machines. It is the goal of the institute to develop CAD systems for the 540 and 580 members of the family which can be used well by various types of industrial and research and development enterprises. At the meeting they introduced four program packages suitable for aiding many engineering tasks from design of printed circuits to chassis modeling and which can be connected into a uniform system.

The FFS--free-form shapes--system of the machine industry automation main department of the SZTAKI [Computer Technology and Automation Research Institute] aids the design and working of free-form surfaces. Although the institute had developed this CAD/CAM procedure, unique within CEMA, some time ago many experts at the meeting, who are important from the viewpoint of spreading it, learned of it only that day.

"Up to now I have seen the application of CAD/CAM only abroad," said Laszlo Ivan, one of the participants at the meeting. As developmental director of Raba he went into detail. Their enterprise had decided long ago to introduce automated design. Their existence on the American market requires use of new methods. They are using the possibilities offered by a computer first in the design of running gear. The "computer technology team" for such an application has already been formed at Raba. CAM--computer aided manufacture--existed long ago at the factory in Gyor. The problem is that convertible money is needed to obtain the required tools, and the choice is limited by the banned list used against us.

Men, To Your Terminals!

At the Csepel Auto Factory they are at the very beginning in spreading computerized design and manufacture. As Ferenc Molnar, chief of the computer technology group, said, they are now collecting experiences from associated enterprises, for example from Ikarus. Their goals are modest--development of only individual CAD workstations is expected in the foreseeable future. And even this depends on the ministry's judgment of their competition entry. "Much depends on how important the enterprise leaders consider computerized methods to be," the group chief said. "I see from the attendance sheet that most of those participating here are high level enterprise leaders." The young man said that among the engineers at the large plant in Szigetszentmiklos, a plant with a great past, it once manufactured airplanes, it is primarily the younger generation who wait for computerized procedures. "We got a good briefing on the domestic possibilities here. But reading the West German journal ZWF we can see that the difference in level is gigantic.... But one has to start somewhere."

"For the time being the Hodgep does not want to deal with computerized design; the manual methods still suit the given tasks," said Ferenc Szeli, chief of the computer technology department of the enterprise in Hodmezovasarhely. They are now installing two computerized numerically controlled--CNC--lathes and one robot; they intend to use a simpler version of computer aided manufacture--CAM--in the operation of these.

At Ganz-Danubius, on the other hand, they are emphasizing the computerization of design, according to Ferenc Molnar, technical deputy director general. "A natural need for this is appearing in our four designing offices; indeed, our engineers are urging its introduction," the leader said. "We design a lot of export jobs. If someone submits traditional documentation on an international tender it is regarded as old-fashioned. The 'elegance' of computer technology is not crucial, but it is an important virtue. It breeds confidence. Naturally we also want to spread computer methods to technology; this conforms with our plans aimed at building up a complex enterprise informatics system."

It appears from the words of the enterprise people that an intent to use CAD/CAM has been formulated. But money is (would be) needed for realization. And even the equipment manufactured here at home has a fearful price--compared to the limited developmental possibilities of Hungarian enterprises.

Chassis Modeling

Computer technology researchers at the university put together a chassis modeling procedure. After a while they had had enough of the clumsiness of the institution. They left and continued the work as an independent firm. In a few years they became a successful enterprise.... This did not happen here, but in a British town.

"We need similarly strong profit interest here," said Tamas Varadi, a department chief at the SZTAKI. "Today we cannot ask industrial enterprises for money for a development which will pay off not in 6 months but rather only after 3 years. And the central sources are very limited. But there are good examples--the FFS system is utilized well at the Csepel machine tool factory. It is important for the domestic achievements to get greater publicity. There has never been a professional day meeting like this one. This gives one hope."

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HUNGARY: INTELLICON, INDUSTRIAL MULTILOOP ADAPTIVE CONTROLLER

Budapest MERES ES AUTOMATIKA in Hungarian No 12, 1986 pp 457-462

[Article by Dr Istvan Vajk and Dr Jeno Hetthessy, Automation Faculty, Budapest Technical University: "INTELLICON: An Industrial, Multiloop Adaptive Controller"]

[Excerpt] A project started in Hungary in 1983 having as its goal the development of a controller with multiloop, intelligent, adaptive features. The project was successfully completed and by 1985 the equipment, called the INTELLICON, already appeared as a factory product. The most important features of the INTELLICON are a high level man-machine link (that is, a very flexible configuration and the possibility of software development) and adaptively tunable PID loops. A general description of the INTELLICON has already been published (L. Rozsa, A. Szigeti, Gy. Varro and F. Zold, "An Intelligent Multiloop Digital Controller," IECON '84, Tokyo) so this article will concentrate only on the adaptation. We give here only a brief description of the specific data of the equipment.

The INTELLICON is a pre-programmed digital controller based on a microcomputer; it satisfies the following modern requirements.

The INTELLICON accepts, measures and processes all information coming from the process--in a manner selected by the user to solve the concrete control task--and then computes and sends to the intervention organ the signals to be controlled by it. In addition it makes accessible all signals desired by the operator of the process and makes them observable through character displays and LED's. There are constantly in EPROM memory more than 50 pre-programmed functions. These serve to carry out the following tasks: danger signal generation, integration, limitation, PID control, cascade and feedforward control, calculating mathematical operations, base signal generation, timing, determining logical functions, etc.

When solving a control task the user selects the desired function from the library. Calling the program block ("wiring") takes place in the way customary with electronic analog equipment. We call this operation the configuration of the INTELLICON (that is, the transmission mode of the controller), which can be executed with the aid of the display and the pushbuttons led to the front panel of the controller. In order to configure the controller at the site

there is no need for computer programming expertise or knowledge of the given program language. When configuration has taken place the control task is stored in a CMOS RAM memory, which can be activated without delay.

All information required by the operator of the process can be obtained from the front panel. The mode selected (manual, automatic, cascade, remote control), control errors (4 LED's per loop) and danger signals for process variables (high and low) pertaining to every control loop appear continually on the screen. In addition, the operator can request write-out to screen of the line number of a selected control loop and the most important data for it (base signal, position of intervention organ, the controlled characteristic, control errors and ratio and PID parameters) and if need be can change the parameters.

The INTELLICON has special hardware and software for continual self-testing. In case of error the system gives a danger signal and the cause of the error appears on the screen. When a total error appears all control loops are automatically switched to the reserve manual control table.

The most important technical data are:

16 analog inputs (0-5, 0-10, 0-20 and 4-20 mA),
32 discrete inputs,
8 pulse inputs (max. 0-50 Hz),
32 discrete outputs,
16 analog outputs (4-20 mA),
8 x 2 switch outputs (to control motor), and
a manual control switch table with the aid of which the number of control loops can be freely selected (a max. of 8 or 16 depending on type of intervention organ); a maximum of two control tasks using two-state input and output signals can be prescribed and one can prescribe control of a maximum of four intermittent tasks.

As an adaptive controller the INTELLICON makes it possible to automatically tune the loop in accordance with changes in the process.

(The article is based on a 1985 article, "INTELLICON: An Industrial Multiloop Adaptive Regulator," IFAC Identification and System Parameter Estimation, York, UK.)

Biographic Notes
Dr Istvan Vajk obtained his engineering degree in 1975 at the Electrical Engineering School of the Budapest Technical University (BME). On the basis of his studies he was awarded the Higher Education Study Medal in 1976. In 1976 he obtained a special engineering degree in research and development. He defended his university doctoral dissertation in 1977 on the subject of identification of systems with parameters changing in time.

Since 1976 he has worked at the Automation Faculty of the BME and is at present an assistant professor. In 1978-79 he worked for 6 months in the United States within the framework of a joint US-Hungarian program. His chief research area is computer control of industrial processes.

Dr Jeno Hetthessy obtained his engineering degree in 1971 at the Electrical Engineering School of the BME. He defended his university doctoral dissertation in 1974 on the subject of on-line ML identification.

He worked in the Electric Power Industry Research Institute until 1978. At present he is an assistant professor at the Automation Faculty of the BME. He obtained a candidate's degree in 1979 with a work on design of self-tuning regulators. In 1983 he worked for 5 months in the United States within the framework of a joint US-Hungarian research program. He is presently a guest professor at the University of Minnesota. His chief research area is microcomputer real-time process control. He is a regular reviewer for the journal IFAC AUTOMATICA.

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SCHEDULE OF COMPUTER FAIRS PUBLISHED

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 6

[Text] According to information received from Hungexpo Hungarian participants (exhibitors) will attend six foreign computer technology fairs in 1987 with a definite amount of state support in each case. These are:

Electronics and Semiconductor Fair, Shanghai, 24-30 April;
Information Technology Fair, Hannover, 4-11 March;
Electronics and Power Plant Fair, Kuala Lumpur, 25-28 March;
Instrument Industry Fair, Singapore, 13-16 May;
Laboratory and Scientific Equipment Fair, Djakarta, 8-12 September; and
Electronics Fair, Djakarta, 10-14 November.

In addition to the above the following computer technology exhibits and fairs are being held, with Hungexpo organizing Hungarian participation at them. The costs of participation at these, however, must be covered in their entirety by the exhibiting enterprises and institutions.

Socialist Countries
Yugoslavia
Zagreb, INTERBIRO/INFORMATIK, information, communications, computer technology and office fair, 12-16 October.

China
Peking, computer technology and communications exhibit, 9-14 September.

Soviet Union
Moscow, SYSTEMOTECHNIKA, office and industrial systems organization exhibit, 16-23 October.

Capitalist Countries
Australia
Melbourne, PC fair, 2-5 June.

Austria
Vienna, IFABO/PROGRAMMA, office and communications technology and software fair, 12-16 May.

Denmark
Coppenhagen, MIKRODATA, micro and minicomputer and software fair, 4-8 March.

United States
Washington, artificial intelligence and modern computer technology exhibit and conference, 29 April-1 May.

Canada
Toronto, CANADIAN COMPUTER SHOW, computer technology fair, 16-19 November.

Norway
Oslo, MIKRODATA, microcomputer exhibit, 6-10 May.

Federal Republic of Germany
Dortmund, COMPUTER SHOW, computer and software fair, 18-22 February;
Dortmund, CIM, computerized manufacturing technology fair, 4-7 November;
Koln, C computer exhibit, 11-14 June;
Munich, SYSTEMS, computer technology and communications fair, 19-23 October;
Stuttgart, CAT, computer controlled technologies fair, June.

Switzerland
Basel, SWISSDATA, informatics fair, 8-12 September.

Sweden
DATA OFFICE, data processing and environmental protection fair, 1-7 October.

Developing Countries
Argentina
Buenos Aires, COM/ARGENTINA, telecommunications and computer exhibit, 2-4 Dec.

Indonesia
Djakarta, COMPUTER INDONESIA, personal and professional computers fair, 20-24 October.

Malaysia
Kuala Lumpur, INFOTECH, computer, telecommunications and office technology fair, 26-29 May;
Kuala Lumpur, COMMUNITECH AND COMPUTER, communications and computer fair, 4-7 November.

Mexico
Mexico City, MEXCOM, computer and communications exhibit, 24-27 February.

Singapore
Singapore, COMPUTER ASIA, personal computer, hardware and software fair, 12-15 August.

Venezuela
Caracas, VENCOM, computer and telecommunications exhibit, 9-12 June.

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HUNGARY: EXPERT SYSTEMS DEVELOPED

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 7

[Text] At the Szabadhegy children's sanatorium a group of physicians led by Ferenc Katona developed swift diagnostic and therapy procedures for nervous system injuries to the newborn. The significance of this is extraordinary because a rather large percentage of infants have some sort of nervous system disorder due partly to injuries during pregnancy, partly to problems with the birth and partly to inherited problems. These can be corrected with very good results in the few weeks after birth--if they are recognized in time.

Under the leadership of Tibor Vamos they developed at the SZTAKI [Computer Technology and Automation Research Institute] an expert system which aids the search for disorders and direct therapy and also instructs those physicians and medical personnel who are learning to recognize this pathology. Many thousands of data and pieces of information are managed in such a way that the relative "distance" to an imagined disorder is measured in a decision space. The central processing is done on an IBM computer system while at the site machines the size of an IBM PC aid the physicians. The system has been working in practice for 2 years already and the international spread of it is now beginning.

Another expert system will try to make the decision systems of local public administration understandable to citizens. Development of this citizen aiding system has now begun. It will aid in the solution of such important problems as authorization procedures for construction and solving visitation problems in the case of divorced parents.

Development of a third set of tools based on artificial intelligence has begun also; an expert system which can be used by mechanical engineers is being developed under the leadership of Jozsef Hatvany.

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HUNGARY: COOPERATIVE DEVELOPS COMPLEMENTARY DEVICES FOR TPA-QUADRO

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 7

[Text] The Megamicro Small Cooperative has developed several useful complementary devices for the TPA-Quadro multiple work station microcomputer of the KFKI [Central Physics Research Institute]. As an expansion of the basic system one can use the parallel processor which makes possible use of the CP/M 2.2 operating system. For those users who have Winchester disk Quadro machines the small cooperative offers a VHS system video recorder coupling unit supplying streamer functions. Control of the video recorder and selection of the several tasks takes place on the basis of a menu list. The interface surface is the so-called SASI/SCSI-BUS.

One can also expand the services of the Quadro with a parity card which, watching data traffic, generates a parity signal similar to memory. By using the card one can collect useful, new information about difficult to find errors.

The eight channel analog subsystem (ADA-8) consists of two independent signal handling parts (an A/D and a D/A transformer). A common control card using the DMA channel of the machine controls thw work of the converters.

Laboratory and industrial users especially can make advantageous use of the IEC (GPIB-BUS) coupling card offered for the Quadro for measurement control and data collection applications.

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HUNGARY: COMPANY MAKES MX-40 MATRIX PRINTERS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 7

[Text] A printer family with 40 character per line capacity which can be built up modularly has been developed at Medicor. Series manufacture of the MX-40 matrix printers will begin in the second half of the year. The basic model will be made in a version which can be built into a set; the highest level member of the family is a desk graphic printer supplied with a standard interface. Within the ever expanding assortment of domestic microprinters the model which can be built in also fills a gap; such peripherals do not yet exist on the domestic or socialist market.

At the same time, the need for a permanent record of information, in alphanumeric and graphc form, appears compellingly with the electronic equipment and instruments used in ever larger numbers. In a number of cases the lack of a suitable printer is holding back the domestic development and manufacture of important sets and terminals (for example, cash-registers, measuring, control and recording devices, medical equipment, commercial, postal, hotel and bank terminals, etc.).

The commercial version of the MX-40 will be capable of printing on divided roll paper. There will also be a version into which one can put certificates and cards. The width of the paper which can be used can be a maximum of 88 mm for all sets.

We are informed that there are no parts of capitalist origin in the printers which can be built in. The matrix head, entirely their own development, contains exclusively domestic materials. The cartridge holding the pins can be easily replaced and according to the plans a new easily inserted cartridge will cost only a few hundred forints.

They also plan to sell an 80 character per second (alphanumeric) or 40 character per second (graphic) desk set which can be used advantageously for PC's at what is expected to be a very favorable price, around 20,000 forints.

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HUNGARY: PREREQUISITES FOR COMPLYING WITH S&T COOPERATION THROUGH 2000

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 8

[Article by Attila Kovacs: "Unpostponable Tasks"]

[Text] The CEMA countries have adopted a complex program for the support and acceleration of scientific and technical development up to the year 2000. The chief directions of this correspond to world trends in technical development. One of these defines the joint developments to be realized and the research results to be achieved in the area of electronification (including computer technology). There can be no doubt that participation in this program will crucially motivate domestic computer technology developments, their goals and the search for related cooperation possibilities in the years ahead (and even this year!). Although the initial steps are reassuring (the intention to form Hungarian-Soviet mixed enterprises, development of annual barter-trade agreements ever better approximating the needs of the program, etc.) in the interest of the success of the initiative we must solve a number of problems in our country, problems which hinder implementation. The old methods are no longer suitable and there is definitely a need for new forms of cooperation, organization and financing.

One of our tasks is to resolve the import of developments and products from socialist countries which are advantageous to us. To do this we must see to it that Hungarian enterprises are increasingly interested in such import. It might be useful to regroup enterprise material assets from the export receipts for the support of import.

We must resolve the contradictions between the sanctioning consequences of specialization agreements and the commission activity of Hungarian foreign trade, contradictions deriving from the mechanism of medium and long-term planning.

We must bring into harmony our interests connected with socialist and private import in the area of professional personal computers. We must resolve in a reassuring way--according to Hungarian market needs--the tensions which can be noted in the area of quality and technical services between the foreign trade enterprises representing potential customers and the foreign partners in the purchase of systems and peripherals.

A simplification of the system of domestic administration might also greatly aid the enterprises participating in the program. We must increase our participation in multilateral, international computer technology development cooperation in proportion to our real industrial and intellectual potential.

There continues to be a significant demand for Hungarian shipments on the Soviet market. Our reputation is traditionally good in the area of energetics, oceanographic and geological research, gas and petroleum industry and railroad applications, as a result of which the users will expect primarily Hungarian equipment in the future also.

In addition to universal computer technology, developments affecting areas not traditionally cultivated by Hungary will appear more strikingly and regularly than before due to the possibilties given by the complex program. These include medical biology electronics, international digital transmission systems, general electronics manufacturing equipment, laser printer peripherals and interface computers. This latter is a new category, an idea born of the computer technology relationships of the socialist countries. Its goal is to aid direct connection of the ESZR [Uniform Computer Technology System] and MSZR [Minicomputer System] computers and the computers representing the various PC trends.

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CSO: 2502/34

HUNGARY: COOPERATIVE TO PRODUCE MAT-386, ARCNET CARDS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 9

[Article by Janos Andor Vertes; an interview with several officials of the Instrument Technology Small Cooperative]

[Text] The mood was very good at the year-end general meeting of the Instrument Technology Small Cooperative. One of the four vice presidents was telling a joke. The scene of the joke was a leadership meeting where someone commented that now it would be enough if a department could maintain the level it had attained. Allegedly the president nodded in approval: "If the workers of some department can do only this, it is enough. But they will be missed!"

The joke in the story is that it is not a joke. The "garage story" began sometime in 1981, when Gabor Szeles, a sort of theoretical instrument development person, stumbled on the regulation that one could form a civil law association. Since a minimum of two people could form an association the two-person Instrument Technology PJT (civil law association) was formed. In the next year the regulators shifted the PJT's in the direction of economic work associations. And in 1985 the increased size justified formation of a small cooperative. How had the size developed? Let us look, for instance, at sales receipts: 1981, under one million forints; 1982, 2-3 million; 1983, 20 million; 1984, 80 million; 1985, 300 million; and 1986, more than 600 million compared to a plan for half a billion.

Since one of the agenda points of the final accounting membership meeting was admission of members, I will try to reckon average performance from the number of members, which has grown to 88.

"Is it possible that one person produced 7-8 million, or does some of this involve employees?"

"We have no employees; after a probationary period everyone who fits in will be a member. Of course, we have many subcontractors; ultimately their work is in the result too. Seven or eight million?" the president asks back, his aspect visibly darkening. "If we measure efficiency that way then our last year was better!"

It is really hard to get Gabor Szeles' recognition. So it appears a big matter that the leadership is recommeding to the membership acceptance of a new possibility of distinction. The name of the new recognition is "presidential praise." It comes with one or one and a half month's pay, but I feel that a "broad smile", the president's praise, competes with the monetary award! Because--at least so it appears to me--it would be accepted with a natural ho-hum in this company if they made a Compaq Deskpro 386 here! And in this connection:

"Will there be a MAT-386? Are the developers at Instrument Technology already working with the Intel 80386 microprocessor?"

Whomever I looked at only hummed and smiled. "Of course," one of them said. "I do not think it is worth writing about now, but at the spring BNV [Budapest International Fair] we will certainly exhibit our own 386 machine," said another. Finally I had to ask permission from the president himself.

"Could I write something like, 'They say that in the near future they will make their own machine based on the 386 microprocessor at the Instrument Technology Small Cooperative'?"

"You can write that they say so," was the answer.

I began to feel euphoric that I had finally nabbed so sensational an item, but Lajos Fogoly, the commercial leader of the cooperative, cooled my enthusiasm.

"It is not probable that this would be the number one news about us. I consider much more important the results achieved in the area of networks. The 386 is still a curiosity. Of course we cannot leave it out, but this is interesting, the other is important."

Well, if it is important it is important. It does no harm to put the important on the table with the interesting. Daniel Bardosi spoke happily of the connection to the Novell network and I happily listened:

"When we began to deal with networks 1-2 years ago, by some happy chance we felt a sympathy for the ARCNET network card. At the time this was at most as good as any other; the luck for us came later with Novell. The Novell NetWare became a real world hit at the end of 1986; the philosophy of this was to integrate into its system the hardware of several dozen other manufacturers instead of its own network card. By sheer chance, among the network cards preferred by Novell, the ARCNET has the property of having a transmission speed (used in a network of a certain size) practically identical with the access speed of the hard disk of the IBM AT, so it can be called optimal in small and medium size networks in the area of price/performance. It only increases the optimum that the price of clones (not only PC clones but in the case of ARCNET clones too) is generally cheaper than the original. Austrian and West German Novell distributers are already ordering ARCNET network cards from Instrument Technology, and among other things it is on this that the small cooperative bases its plan to increase trade in the area of export in 1987."

There is no denying it, it must be admitted that this news competes with the "they say" about the MAT-386. We had come down to earth, so I asked a really down to earth question:

"Finally, how many XT's and AT's does Instrument Technology plan to manufacture in 1987?"

"The situation in Hungary of the PPC supply was studied last year at the government level and as a result, in the wake of an OMFB [National Technical Development Committee] competition, the market (and import) possibilities were divided up. In order that we should not be left out of this division of roles we joined with similar small cooperatives to form a legal entity developmental deposit association under the name PerComp, and we entered the contest together. At our formative meeting we ourselves were surprised to find that by uniting our product we became very strong in a moment; more than 60 percent of the market for professional microcomputers belongs to the association. The essence of our joint concept is that in 1987 we may turn from putting together card level PPC's to building at the IC level. We will start manufacture at the former site of AEV [State Construction Industry Enterprise] Number 43, with the support of the Ministry of Industry and the OKISZ [National Federation of Artisan Cooperatives]. In our longer range thinking we are planning wafer level PPC manufacture, relying on the technological base of the Communications Engineering Cooperative. On this basis we promised the OMFB that if we get an import allowance of 750 dollars per machine then we will manufacture at least 4,000 and perhaps more PPC's in 1987, and bring the price of the AT's under 250,000 forints. Well, despite the fact that the allowance intended for us by the OMFB is about one quarter of what we planned, we are certain that a series of several thousand will succeed, and even the part not participating in this support will reach the market at a favorable price."

I listened to the president as he slowly wound from accomodating to the Economic Committee resolution to the cooperative policy; I listened as he analyzed the regulators, as a professional economic policy maker; I listened as he pondered the possibilities of a billion in sales receipts, as a cold-blooded manager. Finally I listened no longer but asked a question:

"Once there was a researcher who loved human culture as well as instruments, who was devoted to literature. Then a friend came along, and there was a two-person PJT. That was hardly 5 years ago. Doesn't it make one dizzy to look back from these heights of billions of forints at that Gabor Szeles?"

"Hmm. That researcher not only loved literature but nature as well. Then I had time to go rock climbing. Today I do not. But I have not forgotten that if a man does not want to fall he should never look back!"

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SOVIETS PEDDLING MISS-A SYSTEM IN HUNGARY

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 14

[Article by Janos Andor Vertes: "Miss Anna From Moscow"]

[Text] Miss Anna arrived in Budapest as the guest of the Kalman Kando Electric Industry Technical College in the company of two young gallants. Vladimir Butenko, a graduate student all of 24 years old, and Pavel Ruban, chief engineer of the university computer center, took the arm of the lady at the mathematics faculty of the physics department of the Lomonosov University to introduce her, after a pleasant air journey, to the best society in Hungary. The hopeful suitors introduced Miss Anna at the Budapest pharmacy center, the Videoton software manufacturing laboratory and the Kando Computer Technology Institute in Szekesfehervar, and it appears that the charming maiden has conquered the hard software hearts.

Although the brief description of Miss Anna which they offered all those interested (as sort of an advertisment for those seeking a mate) appeared a most dry introduction: "The purpose of the MISS operating system is: writing data processing and scientific calculation programs, debugging and operation; teaching various programming languages; online control; support of large computer networks. The ANNA version can be used on ESZ 1010 (Mitra 15) and ESZ 1011 (Mitra 225-725) machines."

Of course one cannot get Anna married with this sort of thing, especially if we consider that those interested are after all married men. An operating system already runs on these machines, and he who wants to marry the MISS must be unfaithful to the MMT. So the first question to the developers is given: Why did you become unfaithful to the ideal of Monitor Multi Tasking?

"The first ESZ 1010 appeared at the faculty a good 10 years ago, we now have five of them, and since then the machine park has also been expanded by ESZ 1011's; we install the fourth one in 1987. Not only is the acquisition price of these machines expensive servicing them is too so it appeared as a natural need at the computer center to strive for the maximum in the area of exploitation. Well, this is just what the original operating system was not really good at. First we also, as did Videoton on the French system, made minor modifications, but in the end this did not bring a substantial improvement, the system was still slow and one could not work with it in a

time sharing mode from more than four terminals. By the end of 1982 relations between us and the MMT had been become quite embittered and it was time for a divorce."

So in 1983 the Moscow developers set about developing a new ESZ 1010 operating system, and they installed the first version in February 1984. With its aid this 64 kilobyte old machine, with a background memory of only 1.5 megabytes, made possible real simultaneous operation on 12 terminals. (According to the size of Lomonosov a thousand students must get to operate a computer at least three times per semester.)

The new operating system spread in Moscow and began to be introduced in a good number of computer centers--far from the capital. With the aid of the MISS this quite old model machine became suitable for controlling marshalling yards, analyzing aerodynamic experiments and processing large volumes of data.

From the beginning of 1986 this operating system, named the Multipurpose Interactive (Time) Sharing System, the A version received the name Anna, better suiting the MISS abbreviation, spread over, in not quite a year, to the ESZ 1011, and since then more and more workers and graduate students at the university have gone over from the IBM type medium category machine to this mini, now offering many-sided developmental possibilities. Vladimir Butenko obviously is not jealous when he has to introduce MISS Anna; he readily lists the achievements of the lady of his heart.

"Starting from the IDOS idea we developed the system in PLM, the macrolanguage of the ESZ 1011. (We rewrote the PLM itself, but it is a close relative of the ESZ 1011 Programming Language Macro.) The dialogs preserved all the attractive characteristics of IDOS, except that instead of serial messages 'images' appear before the user; the work can speed up 5-10 times. The most essential factor was flexibility, that it should be easy to link new peripherals into the system and convenient to handle the devices connected to the computer. In general the price of generality is that time utilization is not optimal. We were not willing to pay this price; from the catalog system to the time sharing we strove for maximal utilization in everything. An example. As is well known the algorithm which is efficient on a 1.5 M disk for watching the disk map, chaining, cataloging and file handling is certainly slow and certainly wastes operational memory in the case of a 20 megabyte disk and for one of two or three hundred M it is no harm to think out another new algorithm. So in our case the disk management algorithm is not permanent, the name of the management algorithm is on the disk, and by loading it we get the efficiency. So while there are 1-3 disk operations to read in a record in the RSX/11 operating system, widespread on PDP machines, and 2-3 in the case of UNIX, in MISS one reading is virtually always a turning to one disk, only in the case of disks larger than 20 M is there a second disk operation to read every twentieth one (or an average of 1.05). Similarly we tried to optimize the choice possibility in menus appearing on the screen, to minimize the number of necessary key strokes. In the course of development we prepared, in addition to the most important program languages, two special languages, PLM 8080 and PLM PDP. With the former, inside of 3 months, we succeeded in developing a MISS for Intel 8080 based machines (for example, transferring the EDITOR took under 8 hours), and soon the system will behave on a PC compatible

machine just like the ESZ 1011 MISS (naturally, from the viewpoint of the user). The PLM PDP, as the name suggests, opens the door to the PDP 11 and PDP 11/70 type machines; one can already develop programs for these--sitting at a terminal of an ESZ 1011. The speed can be attributed to an extraordinarily convenient tracing function, the step-by-step debugging system and the flexible construction."

After the courtly compliments they introduced MISS Anna herself and dozens of experts at the three computer centers could view her charms. Many were curious about her reliability and about those services which one could not expect from such a rather old girl just because of her age (when the Mitra married the MMT this exponentially growing profession was just half as old as now), and they established that in the shadow of the MISS even the old ESZ 1011 became quite young.

Well, very likely just this may determine the future career of MISS Anna; there is still a future for that hardware to which she has tied her fate.

Will the MISS Win Hearts?
Here are three opinions about the charms and chances of Miss Anna.

Assistant Professor Gabor Peter, president of the Cascade Kando College small cooperative:

When I had a chance to meet Miss Anna 2 months ago in Moscow I mentioned to the developers that the lack of Pascal was a rather big defect in the system; as opposed to BASIC or FORTRAN 77 they should have developed a compiler for this. They just hmmed then, and now they have brought out the first version of Pascal. The compiler, allegedly developed in 300 hours, is not yet perfect, there is no possibility for step-by-step debugging as there is in the others, but it completely meets the standard. This virtuosity dispelled almost all my reservations.

Assistant Professor Tibor Milcsevics, deputy director of the Kando Computer Technology Institute in Szekesfehervar:

I have no doubt that what talented young software experts develop in the 1980's is much better than an operating system dreamed up 20 years ago. Still I must ask whether it is worth it to invest so much intellectual energy in an obsolete machine. Those who operate ESZ 1010 and ESZ 1011 machines have user systems which have been working for a long time, written in database management based on MMT, and certainly they will not develop new ones today or tomorrow. Rewrite these programs now? For the sake of a new system not compatible with anything? The developers said here that in many respects MISS is better than UNIX. I would have been happier if they had surprised us with an ESZ 1011 version of UNIX. It is very hard to compete with world standards; my witnesses might be a few hardware people producing PC's better than the IBM or software people producing a database manager better than dBase.

Endre Kovacs, chief of the software house of the Videoton trade office in Moscow:

When the experts from Lomonosov University sought us out 2-3 years ago, asking us to join in the development, we were most skeptical of the theme, we saw no sense in replacing the basic software for a machine type slowly going out of use. They did not listen to us at Lomonosov and we learned that even if we lay crossways on the road we could not prevent the spread of the MISS in the Soviet Union. What is the chief advantage of this system? In my opinion it is the flexibility. For example, at the Pharmacy Center these boys met with a 300 megabyte disk for the first time in their lives. Everyone who works with an ESZ 1011 knows what it means to generate an MMT monitor for new type peripherals. In MISS everything was ready within an hour and a half for a configuration which they could not have anticipated. Another experiment stands before us; the developers have promised to "add on" to the system, within one month, a synchronous terminal, equal to the 3275. I simply cannot imagine that under MMT anyone could test in a 3275 in less than half a year, not even to speak of having on it the services which the MISS offers. If this experiment succeeds then I will have to say that this system will live on even when there are no more ESZ 1010's or ESZ 1011's.

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HUNGARY: S-CORE, NETWORK OPERATING SYSTEM

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 15

[Article by Attila Kovacs: "S-Core, Friendly Accord"]

[Text] The Accord Small Cooperative has come up with a local network product which can also be sold in developed countries. In cooperation with a partner in the FRG they have developed a hardware-software solution which can be used in a heterogeneous machine environment (large and minicomputers and professional PC's). The product, called "s-core," is most favorable for the user from the viewpoint that applications can be designed without knowledge of the network's characteristics, physical structure or resources. Accord offers not only communication among computers and all software support for it but also every service which belongs to a network.

The fundamental aspect of the concept is that s-core offers a network operating environment. The users (or their programs) see a multiple workstation, multitask system while the physical structure of the system and the distribution of resources or system objects (e.g., tasks and files) remain completely hidden to them.

In the majority of cases the hardware element of s-core is one expansion card (s-core/BOARD) which is connected to the bus system of the receiving computer. This can also be an independent unit (e.g. in the case of large computers) which connects to the high-speed I/O or peripheral channel of the receiving machine.

One of the software elements of s-core is the network operating system (s-core/NET); one of its chief advantages is that to a large extent the network system is independent of the activity taking place in the receiving computer. Another advantage is that enough power is available to perform the network access functions and every other network control operation and service activity. The purpose of s-core/NET is to perform all those operations with the aid of which the various needs of many users can be harmonized. Portability can be ensured primarily by adapting the s-core/BOARD according to the characteristics of the new receiving computer.

The receiving operating system (s-core/HOST) is an important part of s-core. In most cases this is the basic operating system of the receiving machine.

The third software element of s-core is the interface software which represents a bridge between the basic and network operating systems of the computer; that is, it integrates the receiving system into the net.

At present s-core uses a local network technology compatible with Ethernet. The software is independent of the network technology used and is based on only two important properties (sufficiently high transmission speed and the ability to use group addresses). By redesigning the hardware component s-core could also be easily adapted in another communications medium.

One of the biggest advantages of the Accord system is that in it one can design and realize applications systems which are substantially easier and more simple than in other networks. Another essential feature is that one can realize a program level link between user applications connected into the local net. In addition, a basic service of the system is that with programs which are communicating with one another one can produce applications each of which can run on a number of different nodes of the network (thus a single node application is a special case in s-core!).

It is also a significant achievement of the small cooperative that it realized the compatibility of the system with an MS-DOS environment at the PC level. At the beginning of the year they set up, jointly with Elektromodul, a 10 and a 16 node network based on PC/AT machines. They also plan to install additional turnkey systems. The combined price of the control card and the network operating system is presently about 420,000 forints per node. Experts of the famous Diebold firm recently examined s-core and found it internationally marketable.

Now the experts of Accord tersely formulate their chief goals this way: Creation of domestic and foreign model systems and creation of a parts background for mass manufacture and cheap production.

[The elements of the system identified in the accompanying figure are, reading from top to bottom: Ethernet cable system; S-Core/NET, network operating system; S-Core/BOARD; S-Core-HOST interface software; and S-Core/HOST, receiving operating system.]

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HUNGARY: FIRMS TAKE FIRST STEPS TOWARD ESTABLISHING OEM SYSTEM

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 15

[Article by Tamas Kolossa: "A Monumental Plan; A Domestic OEM System"]

[Text] If it is realized the plan initiated by Vilati will be a noteworthy example of the much talked about and much desired concentration of forces or assets. The essence of the plan is creation of an OEM (Original Equipment Manufacturing) system for domestic development and manufacture.

With the support of the OMFB [National Technical Development Committee] and the Ministry of Industry the leading enterprises and research and educational institutions of the automation industry (Vilati, MMG-AM [Mechanical Measuring Instruments Factory Automatic Works], MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences], MIKI [Instrument Industry Research Institute], VEIKI [Electric Power Industry Research Institute] and BME [Budapest Technical University]) have signed the first agreements for joint development and marketing of devices in the plan. The system, using 8, 16 and 32 bit microprocessors, is based on the internationally standardized and swiftly spreading VME bus, and its coupling parameters also correspond to the international standards.

It is the intention of those working out the plan that in addition to the basic modules (single card microcomputers, memories, etc.) the system will contain cards to connect computer peripherals (printers, various stores) and man-machine link devices (keyboards, displays). A number of special modules will be suitable for solving the tasks of industrial controls, process control and telemechanics. The assortment will be completed by an assortment of power units, boxes and cabinets.

Various local network interface modules (PROWAY, MAP, Ethernet, etc.) will serve to link control and computer technology equipment assembled from the OEM system. They will provide for the modules and their connections the operating system, program languages and a few applications programs needed to carry out realtime tasks. They also plan to supply customers with developmental tools and software made from the same modules with the aid of which they can produce new systems.

Since every element of the idea meets the international standards (Europa card dimensions, etc.) they can also use imported modules--meeting the same standards--which in the beginning will be missing from the domestic assortment due to uneconomical series size (e.g., speech synthesizers and image processing modules). In the interest of shortening the developmental time they would like to begin development of not only modules but also developmental equipment and automatic devices with an agreed upon import assortment. Thus domestic enterprises could get important subassemblies before the manufacture planned for 1989. Last but not least, in this 5-year plan they could begin selling products they develop themselves. The manufacturing enterprises (Vilati and MMG-AM) link the plan with considerable technological reconstruction--including introduction of computer aided design and manufacture. In this way they promise an international level in regard to the price, modernness and reliability of the modules. Vilati will undertake to service the modules and to organize a consulting service to aid users and the development of complex OEM based systems.

We are informed that not only do those interested and those responsible for technical development and industrial guidance support the idea in principle but also that a number of competitions and contracts in various OKKFT [National Medium-Range Research and Development Plan] and ministry programs already are based on this truly noteworthy plan. At the moment it is difficult to learn more about the details (probably it is not easy to harmonize the material and other interests). But this much is certain, that the international electronics and computer industry is moving toward a concentration of forces and assets and we must follow this trend.

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HUNGARY: COMPUTER NETWORK FOR CONSTRUCTION FIRMS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 16

[Article by Laszlo Borsos and Laszlo Magda: "Local Network for Material Supply"]

[Text] The local network to be described was realized using support won by two large construction industry enterprises headquartered in Nyiregyhaza, SZAEV and KEMEV, in a competition sponsored by the OMFB [National Technical Development Committee]. The Debrecen subsidiary (EGSZI-Tisza) of the EGSZI [Construction Management and Organization Institute] was commissioned to perform the computer technology development tasks.

The construction industry enterprises, working independently and in isolation, can supply the materials needed to carry out contracting programs in time and in quality only by tying down significant personnel, back-up inventory and storage capacity. An inescapable consequence is that signed delivery contracts cannot be rescheduled during construction in accordance with program modifications, and sooner or later this leads to a piling up of inventory, a shortage of material or the development of idle stockpiles.

A modern solution is for stockpiling and the supply of production materials for producing units which are separate in economic accounting and in their spheres of activity to be handled as a service by a separate supply organization specialized for this purpose. The advantage of this system is that a consolidated acquisition and stockpiling organization, replacing decentralized acquisition and stockpiling, can provide greater supply security with a substantially lower inventory level compared to the volume of production.

Studying, from the data processing viewpoint, a technical-economic model providing the above advantages we can observe three apparently separate subsystems.

The first is a subsystem which describes the moment-by-moment inventory status of the warehouses and changes in this status. The second is a subsystem which handles the distribution of the material needs of the organizations using materials--by production task, item and time period--and handles the availability and use of materials in the same detail as needs.

Finally, in the third subsystem, processing the orders in process, the return receipts and deliveries, is summarized the information describing the link between the organization obtaining the material and the delivery environment.

The subsystems are closely interrelated; changes in the data for each depend on the other two co-systems.

These three subsystems make possible the satisfaction of all essential information needs of the material supply process, if the databanks necessary for the operation of the individual systems are available to all three subsystems with moment-to-moment updating.

A geographically defined local computer network fitting into the work process, performing data recording and processing simultaneously, making use jointly and simultaneously of databanks which are in data transmission contact with one another, is suitable for handling this problem.

The Computer Model

Three types of organization performing different tasks come into information contact through the local net--the special warehouses, the organization preparing and coordinating production and the organization which obtains and supplies materials.

The information generated at the site in connection with material inventories, needs and orders goes to microcomputers linked into the process at all three organizations for the purpose of processing. All organizations can access the separate databanks through the local net as needed, getting information from them or sending the data needed for cooperation. From the viewpoint of the user the local processing and the network communication (e.g., recording materials and querying the inventory) take place simultaneously. The number of workstations can be increased proportional to the organizational units linked into the net; the hardware possibilities should exceed the needs appearing in practice.

Technical Specifications

Use of domestic hardware devices was a prerequisite for system development. The individual work stations are TAP-34 type 8 bit microcomputers, modified to work with the CP/M operating system, with 64 K bytes central memory, two 512 K byte floppy disks and a TMT-120 line printer.

In order to store relatively longer data files we connected a 27 M byte BASF Winchester disk unit to the computer of the material acquisition organization as a file-server station. The network uses LANPBOX (LB) network interfaces developed by MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences].

Workstations located several hundred meters distant in an industrial environment posed special requirements for network disturbance protection. The three network interfaces used are connected by one 600 meter and one 400 meter coaxial TV cable, partly as an underground cable (in a steel protective tube) and partly as overhead cable.

Together with the COBUS line transmitter-receiver the coaxial cable forms a system grounded at one point. It was necessary to use a signal refreshing correpetitor to bridge the 1,000 meter distance.

The workstations are connected to the LANPBOX connector with a serial interface cable within a distance of 30 meters; the remote stations are connected through a TEM 9600 modem pair. In both cases the data transmission speed is 9,600 baud.

Software Development

The TAP-34 machines were not made for the above operating system, so some minor remodeling was necessary. We developed subroutines (index sequential, sequential file manager, screen manager, form manager and keyboard manager) for the modified TAP-34's in the interest of efficient programming.

The routines were prepared with the BASIC and Assembler interface in the Assembler language for the I 8080 processor. The workstations connected to the COBUS local net through the LANPBOX network interfaces make it possible to send and receive messages. Thus it becomes possible for user systems running on individual workstations to communicate with one another.

The routines were prepared in a completely general, parameterizable form, so workstations connected to the gates of the network can address one another as they like. Transmission of the data needed to operate the routines (e.g., the address of the character sequence to be sent, the address of the LANPBOX, the address of the gate, etc.) is realized through registers loaded by the user program.

The status information indicating the success or failure of the transfer proceeds in a similar way. The routines ensure that one can compose a message line corresponding to the syntax of the LANPBOX interface, that the connection is with the proper gate and that the LANPBOX forwards the message line. User programs are written exclusively in the Assembler language because of the relatively limited memory size. This ensures fast, interactive data access between databanks which are greatly segmented and physically isolated due to the limited capacity background storage.

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CSSR: COMPUTER NETWORK FOR CONSTRUCTION FIRMS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 17

[Article by Jiri Zavesky: "Data Transmission Software from Prague"]

[Text] Various, geographically separated guidance levels function at the Teplotechna Praha construction industry enterprise in Czechoslovakia.

Our goal was automation of the guidance activity taking place at the several levels--including the directorate general, the enterprise directorates and the plants.

The task derived from this--concrete development of the network data stations and equipping these with technical devices and microcomputer intelligent terminals. Two years ago we chose the VT-20/A products of the Hungarian Videoton enterprise in the interest of achieving this goal.

The enterprise data transmission network corresponds to the topological layout of the already existing network and its structure follows from the decentralization to the plants of the data recording sites of the automated guidance system.

As for the substantive part of the information to be transmitted, we are talking about extensive volumes of data concerning, for example, the following areas: bookkeeping, preparing and keeping operational records on material use and investment statistics, labor and wage management, operational guidance and planning, etc.

Transmission takes place in 128 byte (stream length) records.

Conditions for Operation

Taking into consideration the compatibility of the linked elements and using data transmission devices we connected the VT-20/A terminals, with the aid of suitable data carrier and external storage units (magnetic tape), to the medium category ESZ 1033 computer of the computer center.

Our program solution can be used on any computer containing a Zilog Z 80 central unit and serial input-output microprocessor (e.g., Videoton VT-20/A, ROCC Teleputer 3, Sinclair ZX Spectrum with SIO enhancement, etc.).

Synchronous modems and switched subscriber telephone lines are needed for data transmission. Naturally there are mutually compatible modems on both sides for data transmission.

Although our solution took the Videoton VT-20/A equipment as a base, any system can be at the other end of the transmission if it has synchronous data transmission software in accordance with the IBM 2780 protocol--e.g., the Redifon R-50, PERTEC XL 40, etc.

Data transmission takes place in the synchronous mode via a switched telephone line at the speed permitted by the synchronous modem used. In our case this speed is the same as that for which the public telephone network in Czechoslovakia ensures conditions, 1,200 baud. We use the IBM 2780 transmission protocol. We either code the characters transmitted in EBCDIC code, in the nontransparent mode, or they are 8 bit binary data, in the transparent mode. Our solution makes other transmission possible also. For example, to transmit characters arriving in ASCII code the program contains ASCII to EBCDIC and reverse conversion programs.

In reality the individual files go disk to disk or, in a configuration not containing disk, the transmission of the data blocks takes place from the external storage unit to the internal operational memory. The user determines the maximal length of files transmitted. In our concrete case this is the optimal length, 128 bits. We provide error protection for transmission of data files by generating and checking a 16 bit CRC character.

The program consists of a main module which calls the subroutines for transmission, reception and help functions. All the modules are recorded in machine code and work directly with the physical SIO. Development was on standard Z 80 assembler under the CP/M operating system.

Management of keyboard input, control of displays on the screen and disk management take place from the CP/M system interface. In the event of running the program under another operating system this system interface part must be changed in accordance with the prescriptions of the operating system.

We also have a version of the data transmission program written in Intel 8080 assembler.

Other Functions of the Data Transmission Program

The program contains the data transmission monitor. The control signals of the IBM 2780 protocol (T for transmit and R for receive), the individual control signals and the numbers of the data files already transmitted are displayed. If the screen is already filled the writing continues from the beginning of the screen. Thus at any moment the personnel operating the equipment can review the status of the transmission, the status of the transmission paths according to the number of newly assumed links and the number of receipt confirmations rejected. It was necessary to provide this because the training of the personnel operating the data terminals located in the various cities of the Czech Socialist Republic does not always come up to expectations, in contrast to the center of the data transmission network and the Prague central

computer center. The program checks the error conditions arising during a transmission and sends the appropriate messages. When he gets the messages the operator can immediately break the link if the error condition prevailing hinders the immediate continuation of transmission. Thus we avoid superfluous blockage of the telephone line, and we save on telephone costs.

In the transparent mode the program can be used to transmit, between systems which are compatible with one another, finished user programs, in machine code.

Transmission Safety

If--as in our case--we use any error protection procedure during transmission then we speak of protected transmission. Error protection procedures are based largely on use of so-called safety codes which make it possible to recognize errors (error recognition codes) or correct them (error correction codes). Safety codes have a certain redundancy; that is, they use more characters than necessary for a given communication, so we do not use them generally. Transmission performance naturally decreases from the "superfluousness" of the safety code. Use of error recognition codes at the receiver end serves to filter out errors which have occurred and to request over the return channel retransmission of the faulty part (signals or blocks). Such error correction takes place either by operator intervention or automatically.

The simplest error recognition code works with cross and longitudinal parity (LRC code). Each data block contains one 8 bit check signal. But this code is not suitable for filtering out errors which occur and pile up in the transmission channels. More effective is a cyclic code (CRC) containing a 16 bit check code; we use this in our system. In this code every bit figures several times in the course of calculating the check signal, not once as in the LRC code. At the same time the probability of unfiltered accumulated error substantially decreases.

According to some estimates the frequency of occurrence of a transmission error with use of a 16 bit CRC code can be put at a ratio of 1:50,000 compared to unprotected transmission.

Transmission Modes and Types

We use a synchronous data transmission mode, which has the feature that the same length of time is available for each signal and transmission takes place continuously. In the interest of mutual time coordination the transmitter and receiver are given the same timing; the transmitted signals keep this in constant synchrony and correct phase.

Transmission of arbitrary 8 bit binary data takes place in the transparent mode; a few combinations may by chance correspond to control signals of the transmission protocol. The protocol is transparent in the case of such combinations.

A given code, generally characters of the ASCII or EBCDIC code, is transmitted in the nontransparent mode. In the code the control signals of the transmission protocol are separated from the data characters.

The SIO (Serial Input/Output) is an LSI integrated circuit of the Zilog Z 80 family which ensures serial input and output of data. It is a universal transmission mode, all transmission parameters can be programmed on it.

Using internal design and programming capacity we realized an integrated system for transmitting and querying group data files via telephone lines, with the aid of efficient data transmission software.

We believe that this is an optimal solution under Czechoslovak conditions; in carrying out the tasks it produces for the user practically error free conditions.

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MICROCOMPUTER PRODUCTION IN BLOC COUNTRIES IN 1986

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 pp 24-25

[Article by Peter Broczko: "European Socialist Countries; Microcomputer Manufacture '86"]

[Text] It had become almost a tradition in the columns of SZAMITASTECHNIKA to review, at the end of each year, the results achieved in the socialist countries. We would like to continue this tradition, which has found a favorable response among our readers, in COMPUTERWORLD/SZAMITASTECHNIKA. Thanks to the faster throughput of the journal we can already summarize the developments and products of last year.

Bulgaria
Among the 8 bit machines no new product appeared in the home computer category. Manufacture of the Pravec 8D introduced in 1984 began but series size is only several hundred units per year. They began to sell these in the shops in 1986 but demand was so great that every shipment immediately sold out. The price of the machine is 420 leva.

There was nothing really new among school computers either although the Pravec 8A appeared as a new model. This, however, is only a variation of the Apple II compatible line which appeared in Bulgaria in 1982. It differs from its predecessors (Pravec 82, Pravec 8B, Pravec 8M) in that the operational memory can be expanded to 1 M bytes. The important event of 1986 in this category was that at the beginning of 1986 they stopped manufacture of the Pravec 82, the most widely used Bulgarian school computer. Manufacture of the Pravec 8A and Pravec 8M began in its place. In 1986 chess computers also appeared in Bulgaria for the general public, especially children.

We can hardly talk any more about a professional 8 bit computer category. The only new model was the Izot 1052 hotel system, which operates essentially as a concentrator for cashregisters.

Last year was characterized by the swift spread in Bulgaria of machines compatible with the IBM PC. The model assortment for these machines expanded significantly. The "simple" PC containing only floppy disk stores seems to be disappearing. Many new versions of machines compatible with the XT and containing Winchester stores appeared but these differ from one another mostly

only in their external design. But it was important that the first non-Hungarian AT compatible machine of the socialist countries appeared in 1986, the Intelat.

In 1986 they centralized the sale of professional microcomputers; only the Technosnab firm is authorized to sell microcomputers. All manufacturers are obliged to market their microcomputers through this commercial firm. The only exception is complex, special purpose systems; the developer of the system can sell the machines which belong to these.

There continues to be a good bit greater demand for than supply of machines compatible with the IBM PC. Independent of this, however, the prices are fixed; a Pravec 16 cost 18,000 leva in 1986, and so far they have sold only about 100 of them. For the time being the already mentioned Intelat machine is sold even domestically only for dollars; it costs 4,500 dollars and in 1986 they put 300 units on the market.

The first Bulgarian made 32 bit machine appeared in the spring of 1986 and by fall had expanded into an entire family. The Interlab machines based on the Motorola 68000 processor are intended primarily for scientific calculations, laboratory instrument control and graphic design; such peripherals have been provided and they have developed software supporting such work. In addition to the Interlab family the VMEI in Sofia introduced its machine, the Fadata, with a similar microelectronic base in the fall.

But the real sensation in this category in 1986 was the Izot 1055C which works with the VMS operating system. With it Bulgaria becomes the third socialist country, after Czechoslovakia and Hungary, to publicly show such a computer.

Among peripherals the greatest new item was introduction of the second Winchester of the socialist countries. Now, after the 1985 premier of the domestic MOM [Hungarian Optical Works] Winchester, one can see the Bulgarian ESZ 5508 model 10 M byte and ESZ 5300 designation 5 M byte units. Among printers the 1986 novelty was the E 1200 matrix printer which also provides multicolor printing.

It follows from what has been said that 1986 resulted in significant progress in Bulgaria, in the development of a new, modern device base and in the spread of it.

Czechoslovakia

In Czechoslovakia, among the 8 bit machines, only the appearance of the Consul 2715, a bit delayed, belonged among the novelties of 1986. They plan to start series manufacture of it, serving professional purposes, in 1987 (!).

Otherwise, unambiguously, this was the year of the appearance of 16 bit models compatible with the IBM PC; they showed such machines in public for the first time in 1986. So we can already see the SMEP PP 06A, announced in 1985, and the SMEP PP 06B, introduced as a new item for 1986. The first corresponds to the IBM PC, the second to the IBM PC/XT. It is also new that a price already figures in the prospectus describing the machines; they sell the smaller for 100,000 crowns and the larger for 150,000. But their planned manufacturing

series is small; they plan to make 50 for 1987 and 400 for 1988, so the price is of theoretical rather than market significance.

The PP 01.16 machine of the VUVT factory in Zilina is actually an IBM PC built into the box of a home computer introduced in 1984, the SO-01 model. An interesting feature of this machine is that for the first time outside the Soviet Union they are using the new Soviet microprocessor, the KM1810VM88, corresponding to the Intel 8088. The price of this microcomputer is extraordinarily low, only 25,000 crowns (about 55,000 forints) with keyboard. They intend to make 200 of them in 1987 and 2,000 in 1988. These machines are intended primarily for schools, especially for institutions of higher learning. According to the announcement the PC 88 model is compatible with the IBM PC/XT, but does not contain a Winchester store.

The M-16-22 minicomputer was a new item last year among the PDP compatible machines. (The 22 refers to the 22 bit addressing possibility.) It costs only one third of what its predecessor did, the SZM 52/11 (1403.M1), already introduced in our country. Its price is 516,000 crowns.

In the area of 32 bit machines they prepared in 1986 to manufacture a VMS compatible machine which appeared in the fall of 1985 and which is even today the largest capacity, socialist made computer of its type. During the year they made about a dozen of them, which corresponds to a fraction of the demand.

1986 did not bring striking progress in Czechoslovakia. Starting a home computer program, developing a comprehensive school computer program, starting manufacture of machines compatible with the IBM PC and some sort of initiative in regard to peripherals are all still awaited.

Poland

The biggest event during the year was in the school computer category; they began manufacture of the ELWRO 800 Junior. This machine, compatible with the ZX Spectrum and the CP/M operating system, is being made in large series at the Wroclaw Computer Factory.

Development of 8 bit professional machines has stopped already; the emphasis has shifted unambiguously to machines compatible with the IBM PC. The model assortment of these had developed already in 1985 and was expanded by only one new model during the year. Although models compatible with the IBM PC/XT already reign in the Polish offering it is interesting that they have not yet made a machine compatible with the IBM PC/AT.

The microcomputer inventory grew significantly in Poland during the year, primarily thanks to machines arriving from Western countries in the tourist trade. The state encourages the import of developed technology by eliminating duties or asking payment of a symbolic duty.

Hungary

In the area of home computers the model assortment had developed by 1986 so no new type of domestic manufacture appeared. But the inventory of domestic home computers increased significantly again, primarily with models brought in from

the West in tourist trade. The circle of vendors of home computers expanded significantly. Going beyond the traditional commission network the national network of the Centrum Department Stores got into the trade; after the middle of the year the TV-Computer of Videoton was being sold in every Centrum store.

In the area of school computers the most important event of the year was the spring announcement of the results of the second domestic school computer contest. Sharpening the competition struggle among the several types, this resulted in a favorable turn--prices fell radically and as a result the inventory of domestic school computers practically doubled.

In our country the professional 8 bit machines survived to the end of 1986 only in special applications. For example, the new models belong here--the Exon bookkeeping machine and the Gepard telex computer. The reason for the stagnation of our market is that their prices did not fall to the same degree as those for the 16 bit machines; by the end of the year the prices for 8 and 16 bit machines overlapped.

The year was marked by the mass spread of 16 bit machines compatible with the IBM PC. Virtually only this type was purchased for professional applications. The supply scale of these machines expanded and shifted in the direction of the more powerful machines compatible with the AT. Among the new models one can find the first domestic made AT compatible machine, the Proper 16/MT. The chief actor in this category was price--during the 12 months of the year prices fell by 40-50 percent. All this can be attributed to the development of an oversupply. And this was primarily the result of the influx of a significant number of Far Eastern machines through various channels--that is, the market mechanisms went into operation.

The appearance of the first true 32 bit microcomputers of domestic manufacture was a sensation of last year--the Mikrosztar 32 and the MVX-32 could be seen at the spring Budapest International Fair. These are the first not only on the domestic market but also among the socialist countries.

During 1986 the price of matrix microprinters fell significantly. For example, the price of the Epson FX-105 printer often used with IBM PC machines was still 150,000-180,000 forints at the beginning of the year and had dropped to 105,000 by the end of the year.

GDR

During the year the Robotron firm began to manufacture the KC 85 home computer and supply improved as a result; it was possible to get domestically made home computers in the GDR.

In 1986 the 8 bit professional microcomputers continued to rule the domestic market, among them especially the Robotron 1715, working with the CP/M operating system and also sold in our country.

Although the first IBM PC compatible microcomputer of the GDR was introduced in the spring of 1985 the year 1986 did not bring its spread. The assortment of models was expanded by only one terminal developed for engineering design and even today they are still awaiting introduction of the first machine

compatible with the IBM PC/XT. A printer family offering double writing speed appeared as a peripheral novelty; the Robotron 6320 models write with a speed of 200 characters per second.

Summing up it can be established that there was no striking progress in the GDR during the year.

Romania

Among home computers the ICE-Felix factory in Bucharest abandoned manufacture of the ZX81 compatible HC-80 and started to make the Spectrum compatible HC-85 in its place. But like its predecessor it can be purchased only by public institutions so it is more correct to include it in the school computer category. The computer named Junior, working with the CP/M operating system, is also aimed at this category, but at a price higher by an order of magnitude.

In Romanian acquisitions for professional purposes they bought primarily the 8 bit Cub machines but the appearance in the fall of the IBM PC compatible Felix PC may act as a novelty. With it Romania also has caught up with the other European socialist countries and as of fall 1986 we could say that at least one IBM PC compatible model was being produced in every European socialist country. They promise to introduce the first Romanian made machine compatlbe with the IBM PC/XT in 1987.

Soviet Union

Retail trade in home computers of Soviet manufacture has begun; the Elektronika BK 0010 can be obtained after prior subscription. Manufacture of the Agat school computer has begun also and together with Japanese machines they have begun to supply the schools with microcomputers.

The 8 bit Iskra 221, compatible with the Wang 2200, continues to be sold in largest volume. During the year, however, two factories, independent of one another, brought out machines compatible with the IBM PC. They promise to start series manufacture in 1987 and appearance of a version equipped with a Winchester store is expected in the same period.

Summary

From the viewpoint of the development of microcomputer technology by the socialist countries the past year cannot be regarded as really successful. The results achieved are extraordinarily modest, so our lag behind the world level increased further during the year. Independent development by the several countries and their setting up for self-supply remain. In the area of microcomputer technology hardware and software trade of the socialist countries among themselves remains negligible. So there is ample room for implementation of the complex program for scientific cooperation up to the year 2000, which is now developing and offering international cooperation on contractual foundations. It is to be hoped that we will begin to feel the favorable effect of this this year.

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HUNGARY: PRODUCTION OF DISPLAY TERMINALS

Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 3, 11 Feb 87 p 32

[Text] Noteworthy news has arrived from Szolnok County--series manufacture of modern display terminals is taking place in the Industrial Main Branch of the Peace Agricultural Producer Cooperative in Zagyvarekas. The devices, which they developed themselves and which are compatible with the DEC VT-102, contain a 31 centimeter diameter green screen monitor (Tungsram TUV 311 or Orion picture tubes). The light strength on the screen is adjustable. One can select a complete Hungarian or English character set from the rubber contact keyboard. Twelve of the 96 keys are function keys and one can find a special international decimal and cursor movement block. The peripherals can be connected to a computer with a serial RS 232 interface. Convenience is increased by the fact that the monitor can be turned or detached and the keyboard connected to it by a spiral cable can be located anywhere.

The price of the displays is 83,000 forints. One can also buy the keyboards separately, for 9,000-12,000 forints depending on how they are finished. The peripherals are sold primarily as part of turnkey systems based on the REKA-16 multi-workstation microcomputer of the cooperative but they can be purchased individually also. This year they plan to sell about 1,000 displays; the first, what you might call reference application can be found at the Korosmenti Agricultural Producer Cooperative in Kunszentmarton.

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INSTITUTE DIRECTOR RATES TELECOMMUNICATIONS R&D

Warsaw PRZEGLAD TECHNICZNY in Polish No 2, 11 Jan 87 pp 6-7

[Interview with Prof Dr Eng Stanislaw Slawinski, director of Warsaw Polytechnic Institute of Telecommunications, by Donat Zatonski; date and place not given]

[Text] Telecommunications is not only a segment of the economy, it also is a separate division of science, and these two areas should be differentiated.

[Question] Telecommunications is generally, though erroneously identified with telephone services. In as much as the latter are poor, one can conclude that the level of basic research and technological design in the area you represent is also poor.

[Answer] Please do not ask me to judge the quality and operating methods of the telephone system as a telecommunications system or as a segment of the economy.

[Question] But what are the components of this network?

[Answer] Describing it in the simplest way, the network consists of 'branches' and 'switching centers.' The task of branches is to transmit signals with minimum distortion. The incoming signals must be separated in the switching centers and transmitted to other appropriate branches. Transmitting information from one switching center to another is known as transmission. The separation of signals in switching centers is called commutation. There are many different telecommunications specializations.

[Question] According to statistics, Poland is at the bottom of the list of European countries regarding number of telephone subscribers per capita. Thus, one can assume that our telephone network is also very simple. We will not discuss that fact. However, if a proper telephone connection is not made, which one of the two named areas is at fault?

[Answer] For faulty connections, if in general the connection is made, most probably the telephone exchange is at fault, that is, commutation. In the domestic network, in most cases, we have to deal with obsolete, overworked equipment that is often poorly maintained. Right here it should be added that

even the most modern and best maintained equipment will not meet expectations if it is too overloaded. For example, there was the new London Stock Exchange computer system that 'clogged up' the day it went into operation. And in Poland? Dialing pulses are transmitted to a telephone exchange when a caller dials a number. These pulses must perform specific requirements. Taking into account the margin of error, I have a question: Does anyone check and maintain the dialing mechanisms on which much depends when we want to call a specific number?

[Question] Information is being obtained from many sources that we are producing and exporting completely new telephone exchanges. However, this information has been heard for the past several years, and I have my doubts. Are these telephone exchanges really modern? For example, the Pentaconta telephone exchange?

[Answer] The Pentaconta is an electromechanical exchange and thus somewhat obsolete. But in its time it was a technological undertaking whose technical results should not be underestimated; it was a giant step forward regarding selector telephone exchanges. However, the E-10 electronic telephone exchange, together with the PCM-30 time multiplexing system, are modern equipments. Of course, one can debate if here the word 'modern' ceases to be important after several months or several years. In modern telecommunications, progress is very dynamic--somethings get old and somethings become modern.

I do not have to look too far for a telephone exchange that would qualify as modern. For example, an electronic telephone exchange has been developed at our institute by the team headed by Docent Dabrowski. It is an achievement from the scientific point of view. In many aspects, its design is original. Its designers have presented it at important, international conferences where much interest was shown in it.

[Question] Professor, you talk about a scientific achievement, but what are the probabilities that it also will become an economic achievement before it becomes obsolete?

[Answer] The TELFA plants in Bydgoscz are very interested in producing these telephone exchanges. I have been in touch with industry for many years. I know all the difficulties of placing our developments into production. This time there are no barriers; these plants are willing to cooperate with us. Additional steps are being pursued very energetically: our documentation is being studied in Bydgoszcz; analyses of production changes are being conducted; we are preparing postgraduate courses on these modern techniques, which we are implementing for plant workers. In my opinion, this is a very positive example of direct and effective association of science and industry. I should add that for TELFA such a telephone exchange is a giant technological leap, almost a complete change of assortment. After all, we are talking about an electronic telephone exchange which, of course, is based on computer techniques.

[Question] Excuse me, but in view of our know reality, this all looks too good.

[Answer] Last year the situation for telecommunications became more favorable: the Central Basic Research Program 02.16, called 'Developing Techniques for Transmitting Information,' was implemented, independent of the existing central program for development research. The basic research program contains seven subprograms and is being done mainly, but not exclusively, by the schools. Much money is reserved for equipment. This means a great deal for basic research and science! Our institute is coordinating three subprograms concerning electronic telecommunications, telecommunications equipment manufacturing technology, and theoretical basis of telecommunications.

[Question] There is a program and subprograms! But is there any money?

[Answer] Of course!

[Question] In this area, research requires more that zlotys; foreign exchange is also needed.

[Answer] Which we have. Not as much as we would like, but more than we had a short while ago. One must realize that the institute finances its operations mainly by cooperating with industry. It receives only one-fourth of its money from the state, for didactic purposes. Despite the fact that we did not complain about cooperating with industry (we even were comfortable in selecting interesting themes), we have not earned any foreign exchange from these contracts. Thus we had to be content with $30-50 and often several hundreds of dollars per year. Considering the needs of such an institute, employing about 150 people, that is practically nothing. Program 02.16 improved the situation in this area greatly, an order or even two greater.

[Question] Without deprecating the institute's scientific research achievements, and without overrating the favorable situation created in association with participation in the central program for basic research, I must return to the so-called humdrum of life. I doubt we can train good engineers in the numerous telecommunications specialties if these engineers, as students, see our technical backwardness, for example, our telephone system.

[Answer] As school employees, we are in no position to influence telecommunications services. These matters depend on sensible economic decisions in which science is important but, in my opinion, people and money are more important. Our teaching program is aimed reputedly at technology of the future. Of course, we cannot ignore that which exists in Poland, even if it is known to be obsolete. We devote as much teaching time to it as it deserves. If the students at our school are involved with electronic telecommunications, fiber-optic telecommunications, data transmission and digital transmission, then, from this alone, one can see that they have close contact with computers, digitization of signals and with that is new in the world.

[Question] If you manage to train an engineer so broadly and in such modern subjects, then where, as a graduate, can this engineer 'sell' this knowledge, where will he work to fulfill his professional aspirations?

[Answer] That is a problem. Our trainees are leaving the communications ministry. They are frustrated and seek work elsewhere at better pay. They are very knowlegeable about computers, after all, an electronic telephone exchange is an uncommon computer.

[Question] How many graduates specialize in telecommunications each year?

[Answer] Our institute confers 60-70 doctor's degrees. This should be increased several times over because several Polish schools train engineers in this specialization.

[Question] How many of them work after graduation in the fields in which they were trained?

[Answer] We estimate only 11-14 percent, no more than 20 percent. Paradoxically, the communications ministry wants to increase the number of students in this field of studies and thus the number of graduates working in the ministry. Simply stated, the communications ministry cannot guarantee attractive jobs, neither with regard to pay nor professional aspirations, to keep these graduates.

[Question] Do you feel that the efforts undertaken by the school, by the Institute of Telecommunications, are to a great extent for naught? The people you train leave for other areas of the economy; after a lapse of several years they will be unable to improve the technical level of our telecommunications in general, especially telephone services, even if conditions allow it.

[Answer] Those are somewhat pretentious conclusions. It is agreed that the equipment and machinery used in Poland's telecommunications network are obsolete and overexploited, and that their operations are unsatisfactory. I will not mention money. But in industry the situation is different. In many cases the work is interesting, the level of technology is much better than the one we are familiar with in the operation of a mass telephone network. Thus, our graduates can achieve professional satisfaction if they accept a job in design or technical offices, for example, with TELKOM association plants.

But even those who enter other fields of the economy can use their acquired knowledge and qualifications. This means that the efforts made to train them are not wasted. It is a fact that telecommunications itself does not benefit as much from these trained people as it should, but this is a matter of economic tactics, cadre policy, pay policy and so on. It so happens that neither the ministry of communications or the TELKOM association can offer their people employment conditions that would be competitive with other offers.

[Question] Thank you for the interview, Professor. However, I am not completely satisfied. I now know that we have many trained people, that science can cope with the problem of modernity, but that the 'deaf telephone' problem continues to be unresolved.

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